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In this issue

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PHR

SYNOPSES

HENNESSY, ALBERT V. (University of Michigan), and DAVENPORT, FRED M.: ***Relative merits of aqueous and adjuvant influenza vaccines when used in a two-dose schedule. Public Health Reports, Vol. 76, May 1961, pp. 411–419.***

Broad and high levels of antibody against all known families of influenza A virus may be induced in both children and adults either by two doses of adjuvant polyvalent vaccine or by aqueous polyvalent vaccine followed by adjuvant polyvalent vaccine. Antibodies so produced remain at high levels for a long period of time while antibodies produced by two doses of aqueous vaccine fall to low levels in 1 year.

In children, two very small doses of virus in adjuvant vaccine gave high levels of antibody even when the interval between inoculations was only 8 weeks.

The findings reported indicate that high, broad, and persistent antibody levels can be achieved in man with a minimum of inoculations and materials.

RICE, CHARLES E. (Veterans Administration Hospital, Perry Point, Md.), BERGER, DAVID G., SEWALL, LEE G., and LEMKAU, PAUL V.: ***Measuring social restoration performance of public psychiatric hospitals. Public Health Reports, Vol. 76, May 1961, pp. 437–446.***

Interest in the problem of how to evaluate the performance of public psychiatric hospitals is growing. The Medical Audit Plan for Psychiatric Hospitals is a research program organized to develop methods for appraising mental hospital effectiveness with respect to the achievement of certain hospital goals or objectives.

This paper describes a method for measuring psychiatric hospital performance in the area of one such goal, social restoration. A hospital's performance in socially restoring its patients may be evaluated at each of three "levels": the extent to which the hospital authorizes the release of patients to the community; the extent to which such patients remain in the community following their release; and the extent to which released patients adjust to living in the community.

The measurement of these levels, based on data obtained by studying cohorts of psychiatric patients, is described in detail. Data gathering methods are described briefly. These methods, should they prove workable, will provide a basis for evaluation of the effectiveness of public psychiatric hospitals and a guide for administrative policy and program decisions.

PHR

SYNOPSES

WIDELOCK, DANIEL (New York City Department of Health); PORTNOY, JOSEPH; TRUELOVE, JOHN; REYNOLDS, ANNA D.; and VANDOW, JULES: ***The USR test as a screening test in a public health laboratory. Public Health Reports, Vol. 76, May 1961, pp. 447–452.***

At the New York City Department of Health a serologic study was undertaken in an attempt to cut the mounting costs of syphilis serology and to solve the problem of the biologic false positive reaction.

During the study 100,000 blood specimens were tested simultaneously by the unheated serum reagin (USR) and VDRL slide tests. All serums reactive with the USR or VDRL tests were further tested by the Kolmer complement fixation test. The findings indicate that the USR test may be employed as a screening procedure in a public health laboratory with a saving in space, personnel, and time.

Treponemal tests, the Reiter protein complement fixation (RPCF) test and the *Treponema pallidum* complement fixation 50 (tpcf-50) test were carried out on 1,885 serums positive by the USR or VDRL tests, or by both, for which a clinical diagnosis was available. Results indicated that the RPCF test may be substituted for the more expensive tpcf-50 test.

A public health laboratory procedure may consist of the following:

1. Use of the USR test as a screening procedure, with all negative results being reported immediately and all USR reactors being tested further.

2. Testing of positive reactors by VDRL titrations, Kolmer complement fixation test, and RPCF test.

3. If additional testing is required, employment of the Nichols strain of *T. pallidum* in an approved test, the fluorescent treponemal antibody (FTA) test, for example.

KELLER, KENNETH; BRASPENNINCKX, HERSCHUL; and KASDAN, MORTON (University of Louisville School of Medicine): ***Detecting viruses on nonporous surfaces by use of the cotton swab technique. Public Health Reports, Vol. 76, May 1961, pp. 453–458.***

A preliminary study was performed to determine whether the standard cotton swab-rinse technique for detecting bacterial contaminants could also be used for the recovery of viruses from nonporous surfaces. The results indicated that, under the experimental conditions described, the percentage of recovery of bacteriophage T1 virus approximates the precision obtained in detecting bacterial contaminants.

The data show that the cotton swab-rinse method is sensitive enough to detect virus when as few as 16 particles are initially applied to a 4-square-inch test surface area and air dried for 1 hour.

As few as 12 TCD_{50}, the virus dose which gives rise to cytopathogenic changes in 50 percent of the tissue culture tubes, of poliovirus 1 per 4 square inches were detected, using five HeLa cell culture tubes per sample, when sampling was done 5 minutes after the test surfaces were contaminated.

When the test surfaces were contaminated and then allowed to air-dry for 1 hour, the end point of poliovirus detection occurred between contaminating inoculum titers of between 6,310 TCD_{50} and 631 TCD_{50} per 4 square inches.

Cincinnati health officials tell how in 1960 a program to immunize the city's children against poliomyelitis with Sabin oral vaccine was set up and operated.

Oral Poliomyelitis Vaccine Program in Cincinnati

EUGENE R. PORTER, M.P.H., and R. EUGENE WEHR, M.D., M.P.H.

CINCINNATI was the first concentrated population area in the United States to undertake a communitywide poliomyelitis vaccination program using Sabin oral vaccine. During two 1-week periods in the spring of 1960, 67,634 children aged 3 months through 5 years and 111,127 school-age children received type 1 vaccine. Preschool children received also, at 4-week intervals, type 3 and type 2 vaccines, and school children received type 3 in November 1960 and type 2 in January 1961.

This paper tells in detail how the program was conceived and carried out, with particular attention to publicity methods and vaccine-dispensing procedures.

Outline of the Program

After a sharp drop in poliomyelitis incidence and mortality in 1957 in Cincinnati, cases and deaths showed a decided tendency to rise again. Believing that efforts to persuade people to be vaccinated should be stepped up, the Cincinnati Board of Health, in February 1960, requested a meeting with the Governing Council of the Cincinnati Academy of Medicine to discuss possibilities of a special vaccination program before the 1960 poliomyelitis season. Originally, the intention was to use Salk vaccine, but at the meeting it was suggested that Dr. Albert Sabin might make available enough of his oral vaccine for such a program.

Early in April 1960, Dr. Sabin did, indeed, offer to supply free enough vaccine to carry out a communitywide program. The objective was to seek the maximum acceptance of vaccine among children.

The academy and the board of health agreed to accept Dr. Sabin's offer. Permission to use the vaccine experimentally was granted by the Ohio Department of Health, and plans for the program proceeded. Speed, of course, was imperative, if the vaccine was to be effective during the expected 1960 poliomyelitis season. Certain other factors also had to be considered in planning the program.

According to Dr. Sabin, optimum results are obtained with his vaccine when the three types, each of which gives immunity to a specific type of poliomyelitis, are given separately. If given together the three types tend to interfere with each other. Dr. Sabin recommends a minimum interval of 4 weeks between doses. He considers 6 weeks optimum but says that a longer period is not detrimental.

Also important in scheduling administration of oral vaccine is its seeding effect. The vaccine

Mr. Porter is director of health education for the Cincinnati Health Department. Dr. Wehr, at the time this program was conducted, was acting commissioner of health for Cincinnati. He is now southwest district health officer, Ohio Department of Health, Dayton.

viruses multiply in the intestinal tract and are therefore sometimes transmitted to close family contacts and playmates. In order to avoid interference of one type of virus with another, Dr. Sabin recommends that the entire community be given the same type of vaccine in the shortest possible time.

It was first decided to limit the program to preschool children, giving them type 1, type 3, and type 2, in that order, at 4-week intervals, starting April 24. This schedule allowed for all three doses before the expected poliomyelitis season. Later, a joint decision by school and health officials led to extension of the program to school children, but it was possible to schedule only one round before the close of school.

The vaccine was administered by private physicians and public and private clinics. All services in connection with administering the vaccine were supplied free, and no charge was made to any person receiving the vaccine. Publicity was donated as a community service by businessmen, newspapers, and radio and television stations. Record forms were printed by the Cincinnati Health Department, Children's Hospital, and the Cincinnati Board of Education. Lay volunteers assisted in filling out record forms and in analyzing data. The director of health education for the Cincinnati Health Department was coordinator of all phases of the program.

A total of 181,784 persons were given type 1 vaccine during the week of April 24 (the preschool program) and the week of May 16 (the school program). These included 67,634 children aged 3 months through 5 years, 111,127 school-age children (6 through 18 years), and 3,023 adults. Of the 3,023 adults, 1,268 were hospital and school personnel; the remaining 1,755 were given the vaccine by private physicians.

Persons receiving the vaccine included residents of Cincinnati and those of the three cities located within Cincinnati's boundaries—Norwood, St. Bernard, and Elmwood Place—as well as a number of persons living in nearby parts of Hamilton County. Excluding the children from Hamilton County, the following tabulation indicates what proportion of children in Cincinnati and the three small cities were given the vaccine. The population figures are official estimates supplied by the office of the mayor in each municipality, and the numbers vaccinated are derived from analysis of a sample of the preschool program records plus an actual count of the school children in each jurisdiction receiving the vaccine.

Age group	*Total population*	*Number vaccinated*	*Percent vaccinated*
3 mo.–5 yr	69, 150	50, 726	73. 4
6 mo.–18 yr	118, 500	93, 195	78. 6
Total	187, 650	143, 921	76. 7

Preschool Program

During the preschool week, 76,205 doses of type 1 vaccine were administered, 67,634 to children aged 3 months through 5 years, 5,930 to school-age children, and the remainder to adults. This age breakdown is estimated from analysis of some 48,000 records.

The program began Sunday, April 24, when many private physicians opened their offices to dispense the vaccine. That day and during the rest of the week, a total of 265 private physicians gave 44,074 doses (see table). The Cincinnati Health Department, starting Monday, April 25, gave 26,152 doses of the vaccine at its 4 regular health-center clinics, plus 20 special clinics throughout the city. The special clinics were set up at locations selected by the district nursing supervisors. Also during the week, the health departments in Norwood and St. Bernard, several local hospitals, and the Babies'

Number of persons receiving Sabin oral poliomyelitis vaccine, preschool program, Cincinnati, 1960

Agency administering vaccine	Type 1	Type 3	Type 2
Babies' Milk Fund Association	1, 913	1, 459	1, 030
Hospital clinics	2, 317	1, 666	1, 519
St. Bernard Health Department	289	265	258
Norwood Health Department	1, 460	1, 071	1, 177
Cincinnati Health Department	26, 152	22, 001	20, 222
Private physicians	44, 074	42, 781	39, 167
Total	76, 205	69, 232	63, 373

Milk Fund Association gave vaccine to an additional 5,979 persons.

The second round for preschool children started May 22. During that week, 69,232 persons received type 3 vaccine, 90.8 percent of those who had received type 1. (Only persons who had received type 1 vaccine as shown by their record cards were given types 3 and 2.) Private physicians administered 42,781 doses; the Cincinnati Health Department, 22,001 doses; and the other clinics, 4,450.

In round three, begun June 19, 63,373, or 83.16 percent, of the original 76,205 persons returned for type 2 vaccine.

School Program

The decision to extend the vaccine program to school children was reached in early May, and within 1 week's time, permit slips were printed, distributed to the children, signed by the parents, and returned to the school. Over the weekend of May 13–15, quotas by schools were established, and school clinic schedules were drawn up on the basis of the returned permit slips.

On Monday morning, May 16, teams of public health physicians, private physicians, and public health nurses began giving type 1 vaccine in the public, private, and parochial schools of Cincinnati, Norwood, and St. Bernard. By late Friday of that week, 87,341 doses had been given.

Since some of the type 1 vaccine set aside for Cincinnati proper was not used, Dr. Sabin offered it to the school systems and other health departments in Hamilton County. Another 17,856 school children received the vaccine from these sources.

Type 3 oral vaccine was given to the school children in November 1960, and type 2 in January 1961.

Publicity

The Sabin oral poliovirus vaccine program received more sustained public-service publicity in the newspapers and on television and radio than any other public health event ever to occur in Cincinnati.

As part of the preparation for the program, a volunteer educational committee was formed, consisting of three prominent local advertising men, plus the executive director of the Greater Cincinnati Hospital Council, the acting health commissioner of Cincinnati, the director of health education for the Cincinnati Health Department, and Dr. Sabin. One of its first acts was to send telegrams to all major advertisers in Cincinnati asking them to donate a segment of their paid advertising for publicity on the vaccine program. The response of these businessmen was gratifying.

Feature articles explaining the effects of the Sabin vaccine and emphasizing its safety were published frequently throughout the campaign in the 2 daily newspapers and the 24 weekly newspapers in the area. Similar information was carried on local radio and television programs. Material was supplied by the Cincinnati Health Department, the Greater Cincinnati Hospital Council, and, of primary importance, by Dr. Sabin himself.

Locations, schedules, and telephone numbers of the hospital and health department clinics were published during the preschool program by all newspapers and announced by the radio and television stations as a public service. In the week before the school program, the two daily newspapers printed copies of the permit slips, which parents could fill out, sign, and send to school so that their children could receive the vaccine.

The eye-catching gimmick used in all the announcements about the program was a picture of a spoon, emphasizing that this vaccine could be taken by mouth rather than injected. Daily counts of the number who had received the vaccine were used to show progress of the program. Movies and still pictures taken by staff photographers from the newspapers and television stations showed the clinics in operation.

The various cooperating agencies were flooded with calls for information. At Children's Hospital four extra telephones had to be installed, and workers recruited by the hospital's volunteer office manned the phones continuously from 8 a.m. until late evening. At least 5,000 or 6,000 calls were handled at this hospital alone.

During the last weekend of the preschool type 1 program, a car with a driver and an announcer was dispatched to cruise in the areas

of the city where the response to the program was lowest. At street corners and wherever people were congregated, the car stopped and the men, using a portable voice-gun, announced the program and the locations and hours of the clinics. Also in these areas, buses and cars were operated over the weekend to bring parents and their children to the clinics free of charge. The buses were equipped with loudspeakers, and some had announcers supplied by local radio stations.

A special clinic was held on three Sundays, for the administration of each type of vaccine, on one of the local television programs for children. Not only were several hundred children given the vaccine, but viewers had an opportunity to see that no "needles" were used.

Cincinnati public health nurses prepare and administer a dose of Sabin oral poliomyelitis vaccine at 1 of the 20 special clinics set up for the program.

Record Forms

Two 3″ x 5″ record forms were completed for each person receiving the vaccine, a data form and an appointment slip. Two copies were made of the data form, one for use by the coordinator of the program and the other by the physician or clinic. Only one copy was made of the appointment slip.

Of prime importance on the data card was a place for the parent's signature. No child was given the vaccine unless this card was signed by one of his parents or legal guardian. In the school program, the "data card" was the previously mentioned "permit slip."

The data card also had spaces on one side for the name of the child, his age, his street address, dates or other indication of the number of Salk vaccine inoculations he had received, and the dates of the Sabin vaccine doses. On the other side, space was provided for the age and Salk vaccination status of the father, mother, siblings, and other members of the household. This side of the card was used only in the preschool program.

An analysis of the first 4,000 record cards returned indicated that the age of the other members of the family and the Salk vaccine status of the siblings had not been clearly explained. The data on these questions were therefore of no statistical value and were no longer tabulated.

The appointment slip served two purposes. It advised the parents of the time the child was to receive the next dose of vaccine, and it was a record for the parents of the dates the Sabin vaccine was received.

Volunteer workers filled out these records in each of the clinics and in most of the private physicians' offices. Members of the PTA did this work in the schools.

Clinic Organization and Supply Lines

In the clinics set up by the Cincinnati Health Department, one series of tables was arranged so that the people would report to these tables first. Here volunteer workers filled out the record forms, or when the crowd was large, the parents filled out the forms and the workers checked them. The parents then took the forms to the public health nurses at another series of tables, where the vaccine was dispensed. Eight volunteers writing records were needed to keep one dispensing table operating efficiently.

A physician was present at each clinic as a consultant. No obviously ill child or any child who had had a tonsillectomy within 2 weeks was given the vaccine, but these were the only conditions under which the vaccine was not administered.

A dose of vaccine was given to each child by a public health nurse or a physician. A dose

consisted of two drops of diluted liquid vaccine added to a small amount of simple sugar sirup in a plastic spoon. Plastic squeeze bottles, similar to those used in restaurants for catsup and mustard, were used to put the sirup into the spoon. The spoons were laid in rows on a tray and filled with sirup, two drops of the vaccine were placed on top of the sirup, and the mixture was fed to the child.

There is no danger of an overdose of the vaccine, but accuracy in measuring the drops is important to avoid waste. Holding the medicine dropper perpendicular to the spoon allows about 15 percent more doses from a given quantity of vaccine than holding it at a near horizontal angle. At an angle, surface tension causes the drops to be unnecessarily large.

The vaccine used in the Cincinnati Health Department clinics was stored in city hall in a freezer. Each morning, the staff of the food and sanitation division transported the required amount of vaccine, sirup, and spoons to the day's scheduled clinics. To keep the vaccine cold while it was being transported, it was placed in insulated bags with a cooling agent such as frozen cans of water.

The vaccine was available to any private physician in the city in a quantity sufficient to immunize all his preschool patients. Private physicians obtained their supply directly from Children's Hospital by presenting prescriptions for the desired amounts. They returned their completed record forms to the coordinator at Children's Hospital for tabulation and retrieved them at the time they called for the next dose of vaccine. Each physician supplied his own sugar sirup, and the children brought their spoons from home.

Volunteers count, alphabetize, and tabulate records of the Cincinnati oral poliomyelitis vaccine program.

The vaccine and records for all clinics other than those of the Cincinnati Health Department were distributed similarly.

Statistical Analysis

As no money was available to pay for professional statistical analysis of the data, the work had to be done by volunteers. A sewing room at Children's Hospital was set aside for the project, and all records from the preschool program, except those of the city health department clinics, were delivered there. Volunteers were recruited by the hospital's director of volunteer services from many organizations: Children's Hospital sewing groups and other women's groups, Community Chest, National Foundation, Anti-Tuberculosis League, Withrow Hi-Y, and Girl Scouts.

When the records were received, they were first counted and then alphabetized for each physician and each clinic. The count was necessary because the second and third doses were allocated according to the number of first doses given at each location.

The project coordinator designed a raw data master sheet on which 35 cards could be tabulated by making checkmarks in appropriate squares. Data pulled were age of child receiving the Sabin vaccine, his Salk vaccine status, and the Salk vaccine status of his mother and his father. Constant attention to family name and address was required to insure that the Salk vaccine status of the parents was listed only once for each family represented by more than one child receiving the Sabin vaccine.

The first subtotal sheet consolidated data on 245 children, and the third total sheet, on 6,125 children. The grand total was arrived at on the final sheet. All totals above the first raw data were computed by the coordinator and experienced volunteer tabulators using electric adding machines, with spot verification. The coordinator was present at all work sessions.

The average volunteer could pull raw data at the rate of about 200 records an hour. Three tabulating sessions were held each day, includ-

ing Saturday and Sunday, one in the morning, one in the afternoon, and one in the evening, for 2½ weeks. More than 900 hours of work were put in by the volunteers.

Data on Salk vaccination status were taken from 45,651 of the preschool records. According to these data, 73.4 percent of the children receiving vaccine from private physicians or the hospital clinics had had three or more doses of Salk vaccine. The percentage for all clinics, except the Cincinnati Health Department clinics, was 54.4 percent; for the clinics located in the low-socioeconomic neighborhoods it was 34.4.

Parents were asked only whether or not they had ever received any Salk vaccine. Forty-six percent of 24,231 fathers and 24.5 percent of 24,545 mothers stated that they had not.

At the conclusion of the program, all records, including those from private physicians, health department clinics, hospital clinics, and the schools, are to be analyzed by census tract to determine areas that need further attention.

Evaluation

Cincinnati's oral poliomyelitis vaccine program was, we feel, remarkably successful. With 181,784 persons receiving at least type 1 vaccine, the response of the public exceeded the expectations of all concerned. The return rates for the preschool children of 91 percent for type 3 and 83 percent for type 2 vaccines also were deemed greater than might be expected.

Admittedly, this program was designed to reach the residents of Cincinnati with all the appropriate devices of persuasion and promotion. The "bandwagon" appeal was exploited to the full. The presence of Dr. Sabin in our community had a strong influence in appealing to local pride. The action of private physicians in opening their offices as a public service for the program had inestimable value in gaining public confidence and participation.

Time, however, was against us in this project. There was not sufficient time to administer the same type vaccine simultaneously in both preschool and school groups or to complete the school program before the expected poliomyelitis season. Ideally, the vaccine program should be started about November and completed before the onset of hot weather the next year.

No cause-and-effect relationship between the vaccine program and incidence of poliomyelitis in Cincinnati can be assumed, of course. Nevertheless, it is gratifying to report that no clinically diagnosed cases of the disease occurred in Cincinnati or even in Hamilton County in 1960, especially when contrasted with the 24 cases of paralytic poliomyelitis reported in greater Cincinnati during 1959.

One case of poliomyelitis was reported in the city in 1960, but onset of paralysis occurred only 13 days after the patient, a 25-year-old man, returned to this area from an extended stay in another part of the United States. He had received neither Salk vaccine nor Sabin vaccine, and he was never associated with any child who had received the Sabin vaccine. One case resembling paralytic poliomyelitis was reported in Hamilton County in September 1960, but Dr. Sabin and his staff were unable to isolate any poliovirus or to demonstrate any rise in titer of poliomyelitis antibodies. They have isolated and demonstrated infection with ECHO type 6 virus.

RECOMMENDATIONS

Surgeon General's Committee on Poliomyelitis Control, January 1961

Toward Poliomyelitis Control

The four goals in the control of poliomyelitis are prevention of epidemics, control of epidemics, prevention of endemic poliomyelitis, and eradication of paralytic strains of poliovirus from the U.S. population. In a meeting at the Communicable Disease Center of the Public Health Service, January 23–24, 1961, the Surgeon General's Committee on Poliomyelitis Control drew up the following recommendations for achieving these goals.

The Immediate Program

Intensification of vaccination. Immediate steps should be taken by all interested groups to intensify drives for vaccination with the formalin-inactivated vaccine. To achieve this each State and local health department should accept responsibility for seeing that there is effective organization of the medical, public health, educational, and citizen resources within its jurisdiction.

The plan proposed by the Public Health Service to encourage local community drives designed to reach the lower socioeconomic and younger age groups through neighborhood organization—the "babies and breadwinners" campaign—is endorsed. It is recommended that the plan be widely distributed by the Service, by the organizations represented on the committee, and by other interested agencies.

The community organization pattern achieved through this effort can be readily extended or modified to other, similar health measures.

Priorities for achieving goals. The following goals and priorities for vaccination efforts are recommended:

- Every unvaccinated person should be fully immunized against poliomyelitis for his own protection.
- Vaccination campaigns should be especially intensive in neighborhoods with less than 85 percent vaccinated in groups under age 6, where epidemics are most likely to occur.
- First priority should be directed to attaining complete and early coverage of the infant and preschool group under 6 years of age.
- Other children under 10 years of age and parents of young children are the next most important groups.

To achieve and maintain these goals requires a highly effective and continuing program of infant vaccination.

Vaccination schedules. At least three doses of formalin-inactivated vaccines should be administered prior to the beginning of the poliomyelitis season. The schedules in present use are:

	Interval from preceding dose	
Order of doses	*Over 6 months old*	*Under 6 months old*[1]
1st	----	1½–2 months.
2d	1 month	1 month.
3d	7 months	1 month.
4th	1 year	7 months.
5th	----	1 year.

[1] Including use of combined antigens for other communicable diseases.

Additional doses. After the completion of either of the above schedules, supplementary booster doses are indicated for children on entry to school and for persons with unusual exposure to infection.

The Continuing Program

A medical procedure. All types of poliomyelitis vaccine should be used only under the direction of licensed physicians or official health departments.

All community-sponsored vaccination programs for the control of poliomyelitis should

be planned and carried out in closest cooperation with private physicians and local medical societies.

Surveys of vaccination status. All communities should conduct periodic evaluations of their vaccination status. The quota sample-survey technique is practical and widely applicable. The Indiana system of requiring school boards to report on the vaccination status of each newly registered child in schools has been tested and is recommended. It is particularly important to maintain up-to-date estimates of the vaccination status of preschool children in neighborhoods of suspected low-immunization levels.

Epidemic use. The use of any available vaccine should be intensified in the face of an epidemic. When oral vaccines become available, every effort should be made to achieve total community participation in the vaccination program on a single day or in a few consecutive days.

Surveillance. The National Poliomyelitis Surveillance Program should be continued and expanded. The essential features include:

- Case investigation consisting of clinical evaluation, history of contact with others who have received polio vaccines within the preceding 2 months, and followup for residual paralysis at 60 days. Manufacturers, lot numbers, and dates of administration of polio vaccines should be recorded.
- Laboratory diagnostic service for each sporadic case of poliomyelitis and a reasonable sampling of epidemic cases.
- Evaluation of the poliomyelitis immunization status of the country annually by a random sample-survey procedure.
- Serologic surveillance consisting of periodic systematic surveys of antibodies to the three types of poliovirus among representative population groups throughout the country to ascertain the levels of serologic response being achieved and to measure the duration and titers of circulating antibodies.
- Virologic surveillance of circulating enteroviruses, including polioviruses, in communities should be carried out.
- Characterization of polioviruses in specially designated laboratories with particular competence to discriminate between "wild" poliovirus strains and the attenuated vaccine strains used as oral vaccine.
- Constant surveillance of the prevalence of poliolike disease through the systematic reporting and laboratory study of cases and outbreaks of ECHO, Coxsackie, and other virus infections simulating poliomyelitis.

Behavioral studies. Repeated observations have shown that there are easily delineated groups which have not been immunized in spite of ready availability of vaccine. Despite these observations of fact, the underlying cause has not been studied sufficiently.

Investigations (possibly correlated with vaccination surveys) should be conducted to identify the barriers that keep people from obtaining the health care they need, and to show how these barriers can be eliminated. The information gathered should be pooled and energetic programs should be undertaken, with adequate resources, to determine how nonacceptance can be overcome.

Research. Further research in the field of inactivated and living virus vaccines is strongly endorsed. Collaboration of scientists, public health officers, and individuals representing various organizations throughout the country who are interested in this problem is encouraged in order to fill in many gaps in our information and knowledge. Examples of such research are:

- Development of markers that are more specific, in order to facilitate strain differentiation.
- Continued efforts to develop more satisfactory strains for vaccine.
- Efforts to provide and evaluate a more potent inactivated vaccine to permit adequate immunization with fewer injections.
- Research seeking the advantages of various vaccination schedules, especially for the newborn.
- The control of epidemics through various applications of available vaccines and programs.

Assistance to other countries. The Surgeon General should encourage the development of

programs to supply immunizing agents to other countries for the control of poliomyelitis.

The Oral Vaccine Program

Production of oral vaccine. The Public Health Service should continue to make every effort to encourage the early production and ready availability of an oral polio vaccine.

Priorities for first available supplies. If the first available supplies of oral polio vaccine are limited in amount, they should be used in the following order:

1. Epidemic control, investigations, and community studies.
2. Vaccination of infants and preschool children.
3. Selected area vaccination of those segments of the population that are least well immunized.

Reserves for epidemic use. The Public Health Service should maintain reserves of oral polio vaccine for use in epidemics.

Vaccination schedules with oral vaccines. When oral vaccines become available, the Public Health Service should recommend dosage schedules based on the report of subcommittee 1, with whatever changes may be indicated at the time.

Municipal Water Pollution Control Needs

The most comprehensive survey of municipal water pollution control needs ever undertaken, covering 48 States, the District of Columbia, Puerto Rico, and the Virgin Islands, was completed early in 1961.

The survey, by the Conference of State Sanitary Engineers, composed of chief engineers of State health departments, disclosed that the United States needs approximately 5,200 new sewage treatment plants, plant enlargements, and additions costing $2 billion.

These projects are required to treat municipal wastes now being discharged into the Nation's waters from a population of about 42 million, the survey shows.

The Public Health Service estimates from the survey that these needs, together with new ones resulting from plant obsolescence and population growth, will carry an annual price tag of about $600 million. This would represent a 40 percent increase in national construction of sewage treatment facilities.

Since passage of the Federal Water Pollution Control Act in 1956, authorizing grants for community waste treatment plants; 2,632 projects have been approved. Grants amounting to $216 million have been made in support of construction costing approximately $1.3 billion. The Federal act allows grants of 30 percent of the total estimated cost, or $250,000, whichever is less.

Each dollar of Federal funds has been matched by $4.80 in local funds. More than half of the projects have been completed, one-fourth are under construction, and the remainder are awaiting construction.

Federally approved projects will serve a total population of 24 million and will abate pollution from municipal wastes in 31,000 miles of streams.

Construction of pollution abatement projects has increased most sharply among communities of less than $50,000 population, which have received nearly 90 percent of the Federal aid.

Legal Note . . . Housing Standards

Ordinance requiring inside bathroom and hot water facilities in each dwelling held constitutional and applicable to existing dwellings. *City of Louisville* v. *Thompson*, 339 S.W. 2d 869 (Kentucky, 1960).

Amending its 1954 "Minimum Standards for Habitable Buildings," the city of Louisville adopted in 1956 the so-called "hot bath" ordinance which required that each dwelling unit be equipped with an inside bathroom, including a toilet, lavatory basin, and bath or shower, and that each kitchen sink, basin, bathtub, and shower be connected to hot and cold waterlines, with water-heating facilities, and to the public sewer. Although the 1954 ordinance allowed a 36-month grace period for installation of inside flush toilets, this ordinance provided none.

Representatives of owners of affected property and real estate agents subject to the ordinance attacked it as unreasonable, unconstitutional, beyond the scope of the police power, and, since no grace period for compliance was allowed, as ex post facto.

Also challenged was the "hardship clause" amendment of 1957 which authorized an exception to the "hot bath" requirement where compliance would cause undue hardship and "when it is clearly evident that reasonable safety and sanitation is assured" and provided that exception might be made subject to conditions and restrictions to achieve that end.

Upholding the ordinances as within the legitimate scope of the police power, the Kentucky Court of Appeals viewed them as part of a nationwide program to eliminate substandard housing. Elimination of slum areas, previously upheld by the court, and the prevention of such conditions, the objective of the ordinances, were regarded by the court to be equally related to the public health, safety, morals, and welfare.

As to reasonableness and the application of the ordinance to existing dwellings, the court noted that legislation otherwise reasonable does not become unreasonable because "it may require the repair, improvement, or even the removal of existing property in order to comply with it." The court accepted without question the relationship of the ordinance to disease and delinquency. Declaring that there "is no longer any reason" for dwellings without "decent bathing facilities" in thickly populated cities, the court held that imposition of cost (estimated as $800 to $1,000 per unit) on the owners rather than asking the public to meet the "unassayable results of submarginal sanitary facilities" was an appropriate judgment by the city legislature and within police power.

Although the ordinance resulted in expense or loss of property, it did not amount to a taking of property without due process of law or without just compensation, or an abridgment of the equal protection clause of the 14th amendment of the Federal Constitution. Nor did it have an ex post facto effect for it did not apply to conditions existing prior to its enactment, but only conduct thereafter.

The omission of an express grace period was not fatal since ". . . it is obvious that a reasonable time must be allowed the affected parties in which to comply, [and] we think the amended ordinance must be construed by necessary implication as allowing a reasonable time." The court also cited the ordinance's provision which allows a violator reasonable time to comply after receiving written notice.

The prohibition against the letting by any "person" of a nonconforming dwelling for occupancy was held applicable to real estate agents as well as owners. Rejecting the argument that innocent agents would be punishable, the court observed that "there is no reason why a rental agent should not be sufficiently familiar with the premises under his control to know whether they are equipped with the facilities required by law. If the owner will not make them so, the agent must disassociate himself."

Finally, as to the "hardship clause," the court said that the granting of an exception was not within the absolute discretion of the administrator, but "must be granted only on the basis of undue hardship and when it is clearly evident that reasonable safety and sanitation are otherwise assured." This criterion was held reasonably adaptable to proof and findings of fact capable of judicial review and an acceptable standard for administrative action.

The court ordered that judgment be entered upholding the ordinances.—SIDNEY EDELMAN, *assistant chief, Public Health Division, Office of the General Counsel, Department of Health, Education, and Welfare.*

Role of the Public Health Nurse in Alcoholic Rehabilitation

JULIA FREUND, M.A., R.N., LESTER H. GLIEDMAN, M.D., ROBERT E. THOMAS, M.D., M.P.H., STANLEY D. IMBER, Ph.D., and ANTHONY R. STONE, M.S.S.W.

IT has been estimated that in 1955 more than 4½ million persons in this country were experiencing severe difficulties related to the excessive use of alcoholic beverages (*1*). It seems apparent that a community needs multiple rehabilitative resources to control this problem. Unfortunately, key services for the alcoholic, such as hospitals, private physicians, and social agencies, do not readily open their doors to these patients (*2*). Alcoholism has become a matter of major concern for public health authorities.

In recognition of the problem the State of Maryland instituted an alcoholic rehabilitation program in 1952. Within the division of mental health of the Maryland State Department of Health, a section on alcohol studies was established and a clinic program started. By 1955, six of the counties in the State had part-time clinics modeled on the traditional psychiatric outpatient clinic. Five operated after daytime hours, one evening a week, and the other worked on Saturdays. In addition to the usual psychiatric team of psychiatrist, psychiatric social worker, and psychologist, a public health nurse was included as a staff member at these clinics.

Five of these original alcoholic rehabilitation clinics have since been combined with existing health department mental health clinics, and today patients with alcoholism are accepted in all of the 22 county mental health clinics operating in Maryland. This study presents data on the attitudes and reactions of public health nurses to the alcoholic rehabilitation program in its early stages.

The nurses employed by Maryland county health departments provide the full range of public health nursing services including health guidance and counseling, care of the sick, school and occupational health nursing, and the management and staffing of the various public health clinics. Although the role and functions of public health nurses in the nonpsychiatric clinics of health departments are well established through long experience, there has been some uncertainty about nursing responsibilities in clinics concerned with mental health and alcoholism. In an effort to clarify nursing responsibilities in the alcoholic rehabilitation clinics, the functions of public health nurses assigned part time to these clinics were described in an unpublished memorandum prepared by the division of public health nursing, Maryland State Department of Health, in 1956.

Nurses were assigned to the clinics to carry out the following activities:

1. To interpret the philosophy and objectives of the overall county health department

Miss Freund is public health nursing consultant, Maryland State Department of Health. Dr. Thomas, formerly chief of the division of mental health, Maryland State Department of Health, is now southern psychiatric consultant with the California State Department of Mental Hygiene. Until his death in May 1958, Dr. Gliedman was assistant professor of psychiatry at Johns Hopkins University, where Dr. Imber is associate professor of medical psychology and Mr. Stone is instructor in psychiatry.

program. (The nurse was usually the only member of the team who was a full-time employee of the county health department.)

2. To emphasize the integral relationship between the physical and emotional aspects of the patient's problems and the familial and community background of the patient.

3. To serve as a resource in relation to local living conditions, customs, and community services.

4. To facilitate the work of the clinic staff through management of clinic quarters, care of equipment and supplies, recordkeeping, and appointment schedules.

5. To represent health department and nursing services in the clinic setting to patients and their families.

6. To participate in interviewing patients and family members in the clinic, coordinating this service with that given by other team members.

7. To participate in clinic staff conferences.

8. To interpret the alcoholic clinic to the health department and the community in general.

9. To encourage and support the clinic staff in their work in public health.

For the purpose of determining the effectiveness of the program and to assist in future planning, the division of mental health conducted an assessment of the county alcoholic rehabilitation clinics in 1956. An evaluation of the general program based on the survey has been published (*3*). This paper reports on the part of the survey which focused on the role of the public health nurse in relation to alcoholism, both as a team member within the clinic setting and as a full-time employee of the county health department outside the clinic.

The term "clinic nurse" refers to a public health nurse assigned to the clinic part time as one of her activities in the generalized family-centered public health nursing service.

A team of research consultants (Gliedman, Imber, and Stone of Johns Hopkins Universversity) planned and conducted the survey. Two forms were developed for recording the data, which were to be supplied in retrospect for the 3-month period immediately preceding completion of the forms. One form was a questionnaire, and the other, a checklist.

The questionnaires were sent to the health officer in each of the six counties maintaining a clinic for alcoholics with the request that they be distributed to a representative sample of nurses performing various types of service for the county. This form was designed to obtain from nurses information on alcoholism in relation to current community preventive activities, education and training, and research in their respective county health department programs. Its purpose was to provide a basis for evaluation of the current status of these activities, the assistance received from the State division of mental health in carrying them out, and the extent and nature of further assistance desired from the division. Though the questionnaire included a number of specific questions, it was open-ended to encourage free expression of opinion on the part of the respondents.

The checklist was designed to gather information concerning the specific tasks performed by each member of the alcoholic rehabilitation clinic staffs. Only the replies obtained from the nurses assigned as clinic team members are reported here. The checklist included such items as number of patients seen by the staff member, amount and type of treatment performed, and variety of contacts with community agencies.

Responses to the Questionnaire

Fifty-three public health nurses, constituting 35 percent of all nurses employed in the health departments of the six counties with alcoholic rehabilitation clinics, completed and returned the questionnaire on their participation in activities concerned with alcoholism. Their responses are summarized below.

Approximately half the nurses indicated they did not participate in any community programs of prevention, education, or public relations focused on alcoholism. Where there was participation, the amount varied considerably from county to county. In some, only a few nurses took part, while in others, apparently, most nurses were involved to some degree. Their activities included distribution of literature, participation in television and radio programs, personal contacts with community agen-

cies, and casefinding. Except for occasional consultation and conferences provided by the State division of mental health, these activities were planned and executed at the local county level. Although slightly more than half the nurses in the sample indicated some need for help (for example, assistance with publicity, program planning, and speakers' bureau), more than 40 percent indicated no desire for assistance. The latter group was comprised primarily of nurses currently not working with families in which there were alcoholic members nor in community projects dealing with alcoholism.

The responding nurses had little understanding or even awareness of the clinic services offered to alcoholics in their counties. They indicated that in general they knew of no specific kinds of help available to them from the division of mental health, and they expressed no interest in obtaining assistance from the division for their own work in this field.

Inservice education and training activities were reported as intermittent and relatively unorganized. No intensive program was mentioned at either the local or State level. There were indications, however, of satisfaction with occasional State-sponsored institutes and conferences and with opportunities to attend the Yale Summer School of Alcohol Studies on scholarships provided by the division of mental health. A few nurses requested further lectures, workshops, and case presentations. Nevertheless, with rare exceptions, nurses indicated no particular desire for division help with respect to inservice education and training.

The responding nurses did not participate in any of the research then in progress, nor were they aware of proffered help from the division in this activity. However, several felt that research should be encouraged.

The nurses were asked in the questionnaire to rank the types of activities with respect to the priority of importance that should be accorded them. They ranked community performance in prevention, education, and public relations as first in significance. Inservice training was given second priority, followed by clinic services and, finally, research.

In addition, the nurses offered general comments and recommendations in the space provided at the end of the questionnaire. A large number reported that they felt isolated from the activities surrounding the alcohol programs in their counties. They requested wider dissemination of information about alcoholism and the rehabilitation programs in their geographic areas. Several of these nurses, none of whom served in the alcoholic rehabilitation clinics, commented on what they considered insufficient and ineffective communication with the staff members of the clinics, including the nurses.

Responses to the Checklist

The five nurses assigned during the sampling period to the alcoholic rehabilitation clinics completed the checklist on tasks performed by clinic staff members. A summary of their responses follows:

Although the nurse working in the clinic saw, for the purpose of nursing service, as many patients on the average as other members of the clinic treatment staff, the extent of her contact with patients varied considerably from clinic to clinic. For example, in one clinic, the nurse apparently saw every patient and provided nursing service for each. In another clinic, however, the nurse did not see a single patient, even though the caseload for other staff members was fairly high.

The nurses serving in clinics reported little difficulty in maintaining contact with other services in and outside the health department, including community resource agencies. Their full-time employment as generalized public health nurses presumably facilitated such communication.

Most nurses believed they were inadequately trained for some of their clinic functions such as skilled interviewing and counseling of psychiatric patients. Some felt they were not performing functions for which they had received special preparation. They were not applying their knowledge of local families and their skill in helping families improve their nutritional and general health status (*4,5*). Another area of nursing competence not fully utilized, according to the respondents, was the nurse's knowledge and experience in the use of the community resources.

Most of the nurses desired more time for pre-

ventive and educational activities, which were allotted only a small part of their scheduled working hours.

Discussion

The potential of public health nurses as participants in alcoholic rehabilitation was for the most part not realized. There was discouragement almost to the point of indifference with regard to participation in the rehabilitative efforts. Even where there was recognized need for further training or expert assistance nurses generally seemed reluctant to request such help. Also, the feelings of isolation from clinic services expressed by those nurses not engaged in actual clinic operations tended to limit further their involvement in the program. Unfortunately, neither they nor the members of the clinic staffs seemed to have made any special effort to improve their distant relationships through more effective communication.

The liaison function of the public health nurses assigned part time to the clinics was not adequately fulfilled, perhaps because the health department administrative structure did not provide a way to accomplish this. Communication usually proceeds from staff nurse to supervisor and through the latter to other members of the nursing staff and the health officer, to whom the psychiatrist-director of the clinic was administratively responsible. Although inservice education and training might have helped to bridge the gap between the public health nursing staffs and the clinics, this activity was not consistently promoted within the county health departments.

The clinic nurses, more than any other team members, felt they were not performing certain functions for which they were specifically trained and which presumably would have contributed to the program goals. Among these functions, several of which were mentioned specifically by the nurses in the survey, the following appeared to be important: providing health guidance to patients and their families and information to other members of the psychiatric team about community resources; concern with and activities related to the general physical and nutritional condition of patients; accumulating data concerning specific familial problems pertinent to the treatment through contact with nursing colleagues and home and school visiting; integrating clinic facilities and activities such as recordkeeping and maintaining appointment schedules; providing the clinic teams with liaison and information related to other health department facilities of potential use in dealing with the clinic caseload.

In summary, three separate (although not necessarily independent) factors seemed to limit the contribution of the nurses to the rehabilitation program:

1. For the nurses serving on the clinic teams, there was a certain misuse or failure to use public health nursing skills.
2. For the nurses not working in the clinics, there was inadequate liaison with the clinics.
3. For the latter group of nurses, there was an apparent lack of interest in and insufficient information concerning the general program.

Some possible explanations for these limiting factors are described below.

The rehabilitation program itself was quite new in the health departments, and guidelines for specific organizational procedures were not available. The clinic staff personnel, recruited almost exclusively from psychiatric settings, quite naturally patterned their new service after the traditional psychiatric outpatient facility. This probably led to the impression that alcoholism is exclusively a psychiatric problem, best left to the special skills of the "experts" who, incidentally, worked after regular health department hours and behind "closed doors." In addition, these new part-time mental health personnel were not well acquainted with other health department programs and practices, including public health nursing services. It seems likely that these clinicians, by virtue of their special training and experience, which focuses on the individual patient, found it difficult to accept the public health nursing approach, which focuses on the family as the unit of treatment. On the other hand, the nurse probably expected her work in these clinics to be much like that in other health department clinics where her duties and responsibilities are clearly delineated and accepted.

The apparent divergence between the basic approach of the nurse and the therapeutic philosophy of the other members of the clinic

team was an especially puzzling problem for the nurse. The traditional psychodynamically oriented techniques utilized by other team members tended to emphasize particularly the confidential nature of information divulged by the patient to the therapist. This special emphasis might easily have aroused feelings of mistrust and rejection on the nurse's part when she found she was seemingly denied access to certain patient data routinely available to her in other health department clinics. The situation posed a dilemma for the nurse. If she adopted the special confidential framework of her new colleagues, she would tend to isolate herself from her own nursing co-workers and seriously hamper her liaison functions with them. If she did not adopt this framework, she could easily find herself excluded from full membership in the clinic team.

Other special problems contributed to the difficulties in liaison between the public health nurses not working in the clinics and the clinic staffs. The typically small caseloads in the clinics (*3*), plus operation of the clinics only in the evening or on Saturday severely restricted opportunities for communication and coordination of services. For the nurse who did not have the experience of working in one of the clinics, there was an additional problem. Generally, she was accustomed to dealing with well-defined disease entities and therapeutic procedures (*6*). Alcoholism, however, presented a symptomatology not easily recognized as a disease entity and for which treatment procedures remained rather unspecific, prolonged, and in many cases, seemingly ineffective. Nevertheless, she recognized the considerable influence of alcoholism on the other health problems requiring her attention and the difficulties in motivating alcoholic patients to seek assistance. It would not be surprising, therefore, if the nurse felt quite powerless because of the limited consultation resources available to her.

Finally, the nurse, like other professional persons, is not entirely immune to the common moralistic and hostile attitudes evoked by the alcoholic and his problems (*6*). This also may have handicapped the nurse in her efforts to orient herself to this illness, whether seen in the clinic or in the community.

With increasing emphasis on psychiatric consultation for public health nurses and more intensive mental health inservice education in some counties, isolation of clinic and nursing services has become a less acute problem. An intensive study of working methods and relationships of public health nurses and psychiatric personnel, begun in 1960 by the Psychiatric Institute of the University of Maryland and the Baltimore City Health Department, Western Health District, should provide more specific information about personnel attitudes that interfere with learning and impede coordination of public health nursing and psychiatric clinic services for the treatment of alcoholism.

Summary

The division of mental health of the Maryland State Department of Health studied the role of the public health nurse assigned part time in alcoholic rehabilitation clinics in six counties and the activities in relation to alcoholism of the other nurses employed by the county health departments in these counties.

Questionnaires concerning pertinent public health nursing activities were completed by 53 nurses who were employed by the counties maintaining alcoholic rehabilitation clinics but who were not themselves attached to one of the clinics. Analysis of the responses to these questionnaires indicates:

1. Approximately half the responding nurses did not participate in community programs of prevention, education, or public relations focused on alcoholism.

2. These nurses had only sparse information about clinic services for the alcoholic offered by their own county health departments.

3. Inservice education and training opportunities concerned with alcoholism were intermittent and relatively unorganized.

4. Nurses expressed strong feelings of isolation from activities surrounding the clinic services for alcoholics.

The nurses serving as part-time members of the treatment teams in the alcoholic rehabilitation clinics felt that they were asked to perform activities for which they were not adequately trained and were not performing

other services for which they were well qualified.

It was concluded that the potential of the public health nurse as a participant in the rehabilitation of alcoholics and their families was being dissipated.

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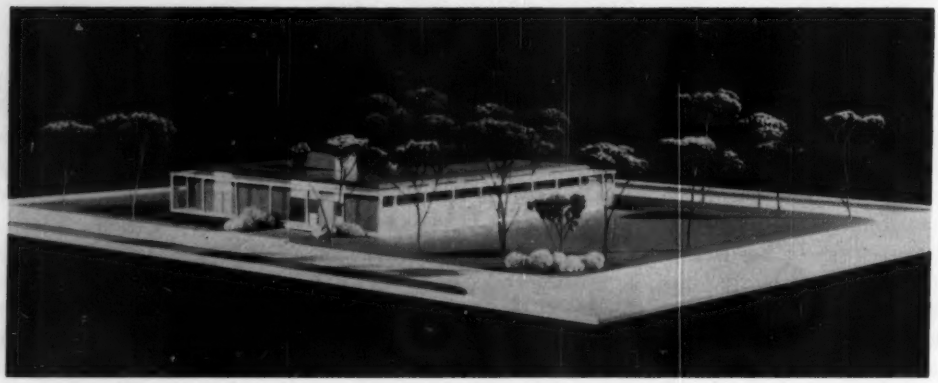


Zoonoses Research Center

The first center dedicated solely to research on the zoonoses has been organized by the University of Illinois. In September 1960, a conference attended by such nationally known medical leaders as Dr. Richard Shope and Dr. Justin Andrews helped formulate plans for the new center. Construction has started on the first of several buildings, a maximally secure research laboratory, an architectural sketch of which is shown above.

The first director of the center is Dr. C. A. Brandly, dean of the College of Veterinary Medicine, University of Illinois. The organization is composed of an executive committee, senior and associate members, and consultants.

The center is organized to further interdisciplinary investigation of the zoonoses. At present, physicians, veterinarians, public health officials, zoologists, parasitologists, epidemiologists, agricultural scientists, microbiologists, and statisticians are members of the center staff.

The emergence of the zoonoses is a fundamental problem to be attacked. For instance, the man-killing influenza pandemic of 1917 is now believed to have entered the swine population as swine influenza, deadly also for that species. Research is underway on parainfluenza, psittacosis, leptospirosis, vibriosis, Q fever, and parasitic zoonoses.

The zoonoses are costly worldwide diseases which have sometimes occupied a no man's land between the professions, especially when the infection in one host has been inapparent. Man as a reservoir host has often been ignored. The center promises to be an effective means of stimulating and promoting research.

Not satisfied with impressions, the American Association of Vital Records and Public Health Statistics has gathered some facts regarding recruitment, training, and salaries.

Statisticians in State Health Departments

HELEN C. CHASE, M.Sc.

IN RECENT YEARS, public health statisticians, like most other public health personnel, have become aware of severe shortages in their profession. Factual information has been inadequate, however, to establish trends in recruitment, training, and salaries.

Responsive to expressed comments regarding this problem, Dr. Albert E. Bailey, former president of the American Association of Vital Records and Public Health Statistics, appointed a Committee on Recruitment, Training, and Salaries "to collect information on what is happening in the various areas with regard to vacancies, new appointments, inservice training, university training institutes, salary changes, and present salary levels." The committee consisted of the author as chairman, Nancy W. Lucas, Ohio State Department of Health, and Melvin R. Wise, Arizona State Department of Health. It was appointed July 1, 1959, and presented its report at the biennial meeting held in Washington, D.C., June 1960. This paper summarizes the most important findings.

To carry out its charge, the committee sought data by means of two questionnaires: one to the heads of the statistical offices of the State, Territorial, and certain city health departments and another to the heads of the departments of biostatistics at the schools of public health. Three health departments with large statistical units (California State, New York City, and New York State) supplied additional information.

Mrs. Chase is principal biostatistician in the office of biostatistics, New York State Department of Health, Albany.

Positions and Salaries

The questionnaire for the health departments was mailed in the spring of 1960 to the 50 States, the 5 cities which are considered independent of the States for vital statistics and registration purposes (Baltimore, Boston, District of Columbia, New Orleans, and New York), and Puerto Rico and the Virgin Islands. Fifty-one of the departments responded, and these are hereafter termed "State" health departments. No reply was received from Louisiana, Minnesota, Nevada, Oregon, South Carolina, or West Virginia. Although these States have some statistical positions, their omission should not seriously alter the results.

The questionnaire defined positions for public health statisticians as "statistical positions requiring a college degree, not necessarily in mathematics or statistics." Although professionally trained statisticians might prefer a more restrictive definition, the committee decided that this definition would obtain information which would be of greatest use to members of the association.

Replies to the questionnaire indicated a total of 306 statistical positions (table 1). Six agencies reported no such positions, and an additional 24 reported fewer than four each. Only six agencies reported 10 or more positions each: Tennessee (10), Maryland (12), Massachusetts (15), New York State, exclusive of

New York City (24), New York City (44), and California (65). These few large units account for more than one-half of the positions listed in this study.

Fifty-six (18 percent) of the 306 positions were reported vacant. Sixteen health departments reported these vacancies. The maximum number was 14, in New York City, which had a vacancy rate of 32 percent. New York State, with 24 positions, had 9 vacancies, a rate of 38 percent. California reported that 15 percent of its positions were vacant. Those departments with large statistical offices (10 or more statistical positions each) had a vacancy rate of 24 percent, while the rate in other departments was only 12 percent.

The range of entering salaries for all positions was very wide, from $2,520 to $12,600. Eight positions had entering salaries of less than $3,000 (table 2). Starting salaries for 281 positions fell between $3,000 and $7,999. Only 17 positions had entering salaries of $8,000 or more. The modal entering salary was between $4,000 and $4,999.

As might be expected, the vacancies tended to concentrate toward the lower end of the salary scale. Twenty-nine percent of the 90 positions with starting salaries of $4,000–$4,999 were vacant. This salary bracket had the greatest number of positions, the greatest number of vacancies, and the highest vacancy rate.

Table 1. Number of positions for public health statisticians, by size of staff, as reported by State health departments,[1] 1960

Number of positions in agency	Number of agencies	Number of positions
Total	51	306
0	6	----
1	7	7
2	9	18
3	8	24
4	2	8
5	5	25
6	4	24
7	3	21
8	0	----
9	1	9
10 or more	6	170

[1] Based on data from 44 States; Baltimore, Boston, District of Columbia, New Orleans, and New York; and Puerto Rico and the Virgin Islands.

Table 2. Positions and vacancies for public health statisticians, by entering salary, as reported by State health departments,[1] 1960

Entering salary	Number of positions	Vacancies	
		Number	Percent
Total	306	56	18
$2,000–$2,999	8	2	14
$3,000–$3,999	35	4	
$4,000–$4,999	90	26	29
$5,000–$5,999	73	9	12
$6,000–$6,999	36	7	19
$7,000–$7,999	47	5	11
$8,000–$8,999	3	1	18
$9,000–$9,999	8	1	
$10,000 and over	6	1	

[1] See footnote, table 1.

Recruitment

Recruitment problems were explored by means of a question on the health department questionnaire which asked what obstacles were evident to the respondents in their recruitment efforts. Of the 45 agencies reporting statistical positions, only 5 reported no problems. Among the remainder, the chief obstacles mentioned were economic factors (primarily low salaries) and lack of qualified applicants. The complete range of replies from the 40 agencies follows. The total of responses exceeds the number of agencies because of multiple answers.

Obstacles to recruitment	*Number of responses*
Economic factors	48
Low salary	37
Better opportunities elsewhere	8
Better fringe benefits elsewhere	3
Lack of qualified applicants	15
Lack of interest in statistical positions	3

The effect of low salaries is substantiated by the relation found between number of vacancies and entering salaries, as shown in table 2. Among the 133 positions with starting salaries of less than $5,000, 32 (24 percent) were vacant, whereas among the 173 positions above that salary, only 24 (14 percent) were vacant.

The lack of qualified applicants was verified by the New York State Department of Health, which reported the results of a special recruitment drive for statistician-trainees (salary, $4,600 a year). The first step was a letter in February 1960 to the placement offices of each of 77 colleges in the State apprising them of opportunities in health statistics and mentioning the State's professional career tests. These examinations are given twice annually to college seniors, and candidates for trainee positions are selected from resulting eligibility lists. The letter closed with an offer to send health department representatives to any school to discuss the examinations and career opportunities with interested students. In response to requests for information, representatives traveled to six campuses in March 1960. Three students were interested enough to request an additional interview and took the examination. Before the end of the school year, one of these had already accepted a position in private industry. The remaining two students were from a college in New York City, an area which offers new graduates more lucrative jobs than they could get in State service in Albany.

Furthermore, New York State reported that the eligibility lists were of limited usefulness because of their timing. Although students can take the examination during their senior year, the lists are not released until late July or August. The delay is due to the mechanics of clearing credentials and certifying the lists. By that time, most applicants are committed to other employment.

Loss of Personnel

The gains which might be realized through a fruitful recruitment program could be offset by a rapid turnover of personnel. Therefore, the health agencies were asked to specify the chief causes of loss of public health statisticians. Among the 45 agencies reporting statistical positions, 2 failed to answer this question, and 2 reported no problems. Among the remaining 41 replies, reasons for loss of personnel were, again, economic. Next in importance was natural attrition: marriage, retirement, or death. The full range of replies was as follows:

Reason for leaving	*Number of responses*
Economic factors	37
Low salary	25
Better opportunities elsewhere	7
Lack of opportunities for promotion	5
Personal (marriage, retirement, death)	13
Preference for another field of work	2
Inability to produce required work	1
Reduction in force	1

For another study (unpublished), the State health departments in New York and California pooled information for a 5-year period (1954–58) to ascertain reasons for loss of personnel, with the following results:

	Number of persons	
Reason for leaving	*California*	*New York State*
Employment in another statistical position	9	9
Personal (moved with husband, motherhood)	13	4
Returned to school	4	3
Preference for another occupation	2	4
Resignation requested	2	1
	30	21

During this period, salary levels and promotional opportunities were decidedly more advantageous in California than in New York State, and this difference is reflected in the distribution above. The chief reason for resignation in California was personal, while in New York State the chief reason was to change to another statistical position with a higher salary. About one-third of the resignations in California and almost one-half of those in New York State were for employment in other statistical jobs, which corresponds to the group of economic reasons listed in the questionnaire to the States.

The situation is aggravated as economic pressures increase. The New York City Department of Health reported its experience over a 5-year period (1955–59) with two types of positions.

	Assistant statistician	*Statistician*
Entering salary	$4,250	$5,150
Number of budgeted positions [1]	24	9.8
Number of vacancies [1]	10.6	1.4
Percent turnover [1]	44	14

[1] Annual average.

Thus at the lower salary the turnover is about half. The adverse effects of such a turnover rate on the operations of a statistical office are many: lack of continuity, unfinished projects, costly training of a revolving pool of new, untrained incumbents, to mention a few.

Academic Training

Of the 250 persons employed in statistical positions in the health agencies, 123 (49 percent) were college graduates with at least one additional year of full-time graduate training in statistics, mathematics, public health, or other pertinent field.

Thirty-two of the health agencies reported that their States provide funds (either State or Federal, or both) for graduate training in biostatistics. One department, however, specified that recent legislation precludes the use of State funds for training for credit. At the time the questionnaires were completed, 6 agencies had 15 statisticians in training, as follows: 9 with Federal funds; 5, employees' funds; and 1, State funds. Thus, the major portion of graduate training of statisticians in State health agencies is being financed by Federal funds.

To supplement these data, the questionnaire to the schools of public health was intended to obtain information regarding trends in number of persons receiving training in biostatistics and adequacy of training funds. Eight of the 10 schools which were sent a questionnaire replied. The reply from one, with only four graduate students in each of the last two academic years, was excluded because the responses were incomplete. The following statements are therefore based on answers from seven schools. Foreign students as well as U.S. citizens are included.

The number of candidates in training and the number of degrees awarded in biostatistics in each of the last 5 academic years are shown in table 3. Only two schools reported candidates for bachelor's degrees in biostatistics. At this level, the number of candidates more than doubled during the 5-year period, but dropped slightly in the 1959–60 academic year. At the master's degree level, the number of candidates almost doubled, but showed no increase in the 1959–60 year over the preceding year.

Only at the doctoral level was there a steady increase over this 5-year period, when the number of candidates trebled. In part, this reflects the fact that a longer period of time is required to obtain the doctoral degree, and the same person is therefore reported in successive years. The trend in number of degrees granted, however, is consistent with the upward trend in number of students in training. The total number of degrees awarded increased from 16 to 45 during the first 4 years of the period, but dropped to 30 in the most recent year.

During this period of growth, increased Federal funds became available for training biostatisticians. A number of statisticians

Table 3. Candidates in training and degrees awarded in biostatistics by schools of public health,[1] academic years, 1955–56 to 1959–60

Academic year	Candidates in training				Degrees granted			
	Total	Bachelor's degree [2]	Master's degree	Doctor's degree	Total	Bachelor's degree [2]	Master's degree	Doctor's degree
Total	----------	----------	----------	----------	142	21	98	23
1959–60	102	12	55	35	30	4	20	6
1958–59	99	15	55	29	45	7	29	9
1957–58	81	12	46	23	30	4	22	4
1956–57	61	8	31	22	21	3	16	2
1955–56	46	5	29	12	16	3	11	2

[1] Based on data from seven schools of public health: California, Columbia, Harvard, Minnesota, North Carolina, Tulane, and Yale.
[2] Only California and Minnesota indicated candidates.

already working in the field, as well as persons new to the field, took advantage of this opportunity to obtain a degree. Hence, the question arises: What is the net gain from this training program? The schools were asked to indicate what their students in the 1959–60 year were doing the previous year and what they expected to be doing the succeeding year. The seven schools reported as follows for the 99 students in training in 1959–60:

Status	*Preceding year*	*Succeeding year*
In academic training	70	63
Employed as biostatistician	16	21
Employed in other work	13	15

Thus, two-thirds of the 1959–60 students planned to continue their training in 1960–61. The number of employed biostatisticians withdrawn for training in 1959 was 16, and it was anticipated that 21 would return to such employment in 1960. The difference is a net gain of only five professionally trained persons from seven schools, and these may include foreign students. This increase is far from adequate to fill the many vacancies reported by the State agencies, to say nothing of the needs of other governmental agencies, universities, and research institutions.

Lack of training funds does not seem to be a problem. The schools were asked to indicate whether sufficient funds were available in the 1959–60 academic year to train all qualified applicants who requested financial aid. Six schools answered "Yes"; only one replied "No." One of the six volunteered the information, however, that although sufficient funds were available for the 1959–60 year, this would not be true for the 1960–61 year.

Current Activities

On their questionnaires the health departments indicated many attempts to correct their personnel problems. California reported a one-step adjustment in minimum and maximum salaries for all grades effective July 1, 1959, and the possibility of another such increase July 1, 1960. Maryland mentioned a 5 percent salary increase and establishment of a new position: director, program evaluation. Michigan reported the possibility of upgrading one position. New York City specified an increase of one salary step for almost all positions. New York State reported an impending increase in the number of higher positions at the cost of abolishing lower positions, with a net decrease in total budget. Tennessee said that positions and salaries were under study and that a new setup might be expected by July 1960.

With regard to training, Illinois reported that it had received approval of a plan for inservice and academic training because of unsuccessful results of active recruitment efforts. Texas, however, reported passage of a law prohibiting use of State funds for formal training for credit.

This listing is incomplete because this information was volunteered. No specific question regarding changes was asked, but the information is indicative of widespread recognition of a need for corrective action.

Discussion

The study clearly establishes that a shortage of statisticians exists in State health agencies. This shortage can be alleviated in several ways: by retaining trained personnel, by recruiting trained personnel, or by recruiting untrained personnel. The study indicates also that economic factors, principally low salaries, are the leading cause of loss of personnel, as well as the most common barrier to recruitment of new personnel. Furthermore, not nearly enough biostatisticians are currently completing their training at the schools of public health to fill the needs, despite availability of financial assistance.

Possible solutions open to the health agencies are limited. They can offer higher salaries or better fringe benefits. They can provide opportunities for advanced training, with commensurate increase in economic benefits on completion of training. Or they can lower job qualifications with no increase in salary.

Agencies offering higher salaries are undoubtedly in the best position to recruit trained personnel. These agencies can therefore be relatively selective in their choices, and they usually do not have to bear the cost of training. High salaries are also an inducement to employees to remain in their jobs, thus mitigating the problem of discontinuity of service.

In recruiting persons new to the field, statistical offices must compete with many other employers for those persons with sufficient mathematical training to form a base for statistical work. Offering such persons the opportunity for graduate training can be an effective recruiting device. However, unless the hiring agency recognizes the greater economic value of these employees after training, they may soon be enticed elsewhere by higher salaries.

Lowering job qualifications may appear an attractive solution, at least temporarily, but the disadvantages must not be overlooked. At first, employees hired under such a policy lack technical competence to perform in a professional capacity. Then, after a short period of employment, if they are capable and ambitious, it is likely they will seek the academic training they lack. The hiring agency may or may not finance such training, but in either event, the employee's leaving means discontinuity in service. Unless the agency provides the training, the employee is usually not obligated to return to the agency after completing his training, and unless the agency is willing to recognize the higher economic value of this trained person, the separation may be permanent. There follows the hiring of a new untrained person to start the cycle over again. If the pattern is repeated often enough, an agency operating under this policy becomes a recruiter of untrained individuals whose ultimate greater capabilities benefit only other agencies.

In the balancing of these various considerations, the heads of the statistical offices are often not the deciding force. Generally, statistical positions are grouped with other positions in the class of professional personnel. For example, the starting salary for entering statistician-trainees in New York State is the same as for other trainees: bacteriologist, planning, economist, education, or forester, to name a few. Usually, uniform policy decisions regarding the professional class are applied by the civil service or budget branch of a State government. Broad administrative decisions regarding this class without attention to shortages in specific categories may aggravate rather than resolve the issue. It should be recognized that statisticians are generally drawn from a small pool of mathematically trained persons for whom a great deal of competition exists. In this respect, they differ from some of the less technical professions.

Summary

Questionnaires covering salaries, recruitment, and training of public health statisticians were completed by 46 State and Territorial and 5 "independent" city health departments and by 7 schools of public health. The health agencies reported that 18 percent of all their positions for health statisticians were vacant, demonstrating that a serious problem exists in filling these positions. Their replies strongly indicate, further, that economic factors are the chief obstacles to filling these positions. Salaries in the $4,000–$4,999 bracket are accompanied by a vacancy rate of 29 percent. Also, economic factors lead all other causes as a reason for loss of personnel.

The current rate of training public health statisticians at the schools of public health is not adequate to fill the needs of these agencies. Only at the doctoral level did the number of candidates in training at the schools in 1959–60 increase over the previous year, although there was an increase at all levels over the 5-year period 1955–56 to 1959–60.

This slackening trend does not seem, however, to be due to any serious lack of funds for training biostatisticians. Thirty-two of the health agencies indicated that training funds were available, but only six had employees in training during the 1959–60 academic year. Six of the seven schools of public health reported adequate funds for all qualified applicants for financial assistance.

Thus, vacancies among public health statistical positions in State public health agencies apparently are not due to lack of training opportunities. They are related chiefly to economic barriers to recruitment, economic reasons for resignation, and a short supply of qualified persons.

Rabies Outbreak in Imperial County

HYLAND J. HEBERT, M.D., and GEORGE L. HUMPHREY, D.V.M., M.P.H.

MEASURES to control an outbreak of rabies in the Imperial Valley of California are an example of what a community can accomplish in the face of a serious threat to public health. In the valley and in the neighboring Mexican State of Baja California del Norte, 438 animals were pronounced rabid, and 1,894 persons reported animal bites, with more than 1,000 receiving antirabies treatment, during a 14-month period in 1959–60 (*1–3*).

A citizens action committee for rabies control, an intensive health education program, emergency dog-vaccination clinics, and strict quarantine regulations with severe penalties for violations helped to turn public apathy, resentment, and later fear into cooperation. Among the forces marshaled against the outbreak were an array of organizations ranging from the farmers association and the parent-teacher associations through city, county, State, and national government agencies to the Pan American Sanitary Bureau.

The origin of the disease outbreak and the exact number of animals dying of rabies are unknown. A rabid coyote, killed recently at Jacumba, San Diego County, near the area where the first rabid dog in the epidemic was identified, points to the predatory animal population as the source.

The geography of the Imperial Valley and the contiguous Mexicali Valley, which has essentially the same topography, climate, natural boundaries, irrigation systems, and predatory animal habitats, supports this theory. The riverbeds of the New and Alamo Rivers, stretching north from the United States-Mexico border through the Imperial Valley to the Salton Sea, are covered with heavy vegetation and form excellent retreats for predatory animals. East and west of the irrigated area of the valley are unpopulated desert wastelands and mountainous terrain.

There had been no effective predatory animal control in Imperial County for several years before the outbreak. The coyote, fox, skunk, and feral dog populations were inordinately high east and west of the valley and in the two riverbeds.

Prior to the epidemic, the most recent cases of rabies in the Imperial Valley had occurred in two feed-lot cows in April and May 1958 in the Calexico area. A rabid bat was reported from Winterhaven in December 1958. The most recent case of rabies identified in Baja California had occurred in 1953. During August and September 1959, health authorities in Mexicali noticed a considerable increase in the number of persons bitten by dogs, and on September 17 the first case of canine rabies proved by laboratory test was identified in Mexicali.

The first rabid dog in the Imperial Valley was identified by laboratory test on September 9, 1959, although a dog that acted strangely was observed on September 1 by a person who had previously seen canine rabies. This animal was shot but no laboratory tests were made. The severity of the epidemic gradually increased on both sides of the border from September to a peak incidence in November–December (tables 1 and 2).

Initial Control Measures

Under provisions of the California Health and Safety Code (*4*), on November 4, 1959,

Dr. Hebert, formerly health officer of Imperial County, is now director of maternal and child health, Imperial County Health Department, El Centro, Calif. Dr. Humphrey heads the State rabies control program, veterinary public health section, bureau of communicable diseases, California State Department of Public Health, Berkeley.

the Region I Advisory Committee, California State Department of Public Health, declared Imperial County a rabies area, effective December 2, 1959. Section 1920 of the code requires that all dogs 4 months of age or older be licensed and vaccinated against rabies, and that dogs under 4 months of age be confined. It also requires the governing bodies to provide a pound and pickup system to enforce the provisions of section 1920, and to provide for low-cost public vaccination clinics.

With seven cases of rabies confirmed by laboratory examination, Dr. Austin W. Matthis, then county health officer, on November 5, 1959, declared a 60-day quarantine of all dogs in the portion of the county south of U.S. Highway 80, including the city of El Centro (see map).

Three days earlier, Calexico officials warned citizens to keep their dogs in quarantine and began to destroy all stray dogs on the city streets under provisions of the city's dog control ordinance. Public criticism was vociferous and reached extremes when several dogs were reportedly shot in view of children on their way home from school. However, one dog, shot on November 5 as it approached a school ground, was proved rabid on laboratory examination. A total of 138 dogs were shot in Calexico by December 14, and through May 25, 1960, 451 dogs (125 were considered clinically rabid and 8 confirmed by laboratory examination) were killed in the Calexico area (*1*).

Subsequent events proved the wisdom of Calexico's action, and when the magnitude of the outbreak was realized, there was general public acceptance. In retrospect, there is no doubt that action by the city from November 3 through December 18 was a major factor in containing the outbreak and slowing the spread of the Imperial Valley phase pending ultimate action by the rest of the county.

On request of the health officer, Dr. Humphrey visited Imperial County on November 18 and recommended that the quarantine area be extended, that emergency dog-vaccination clinics be held, and that control measures for predatory wildlife be started along the international border and adjacent to the quarantine area. The county board of supervisors appropriated funds for setting up poison-bait stations, for a small dog pound, and for hiring an assistant to the county poundmaster. The city of El Centro and other urban communities also appropriated funds for dog pounds.

Between November 1 and December 10, 1959, the incidence of reported dog bites, the number of animals submitted for examination by the county health department laboratory, and the number of persons placed under Pasteur treatment showed an alarming increase.

On December 12, 1959, Dr. Hebert, who had become county health officer on December 1, extended the quarantine. It remained in effect in the entire county until April 14, 1960, and in the southern portion until June 14, 1960.

Emotional aspects often were important factors both in the lack of public cooperation and in the eventual control of the outbreak. For example, a father rushed out of his house, shotgun in hand, shot the family cat, and unwittingly hit his son in the legs with pellets which had passed through the cat's brain. The animal had been behaving strangely prior to the shooting. The child received antirabies vaccine.

Fear, superstition, and misinformation

Table 1. Rabies outbreak in Imperial County, Calif., September 1959–March 1960

Persons and animals affected	September	October	November	December	January	February	March–April	Total
Persons reporting animal bites	0	0	0	118	69	25	18	230
Persons given antirabies vaccine	0	0	0	74	30	0	0	104
Rabid animals (laboratory confirmed)	2	3	9	15	8	1	2	40
Rabid animals (clinical diagnosis)	1	0	0	65	69	13	[1] 30	178

[1] These 30 dogs, judged rabid by Calexico officials, were destroyed. None were known to have bitten Calexico residents. They were thought to be animals which had crossed the border, since most were shot or picked up within 1 or 2 blocks of the port of entry.

Table 2. Cases of animal rabies by species, Imperial County, Calif., August 28, 1959–October 31, 1960, and Mexicali, Mexico, September 17, 1959–October 29, 1960

Rabid animals, by species	Total cases	Imperial County	Mexicali
Total	438	219	219
Laboratory confirmed	119	[1] 42	77
Dog	109	[2] 38	71
Cat	4	0	4
Cow	3	2	1
Horse	2	2	0
Squirrel	1	0	[3] 1
Clinically diagnosed	319	177	142
Dog	303	166	137
Cat	5	0	5
Cow	11	11	0

[1] Only laboratory-confirmed cases were reported on State health department form ACD–77.
[2] Nine cases originated from Mexicali.
[3] Pet squirrel.

SOURCES: Reference 2; California State Department of Public Health, Epidemiologic report of a case of animal rabies, form ACD–77; Report from Imperial County Health Department; and Servicios Coordinados de Salubridad y Asistencia, Baja California del Norte, Mexicali, Informe semanal de epizootia rabia en Mexicali, del 14 de diciembre de 1959 al 30 de octubre de 1960.

were evident during the worst of the outbreak. An assortment of animals from mice to muskrats were submitted to the laboratory for examination with vociferous demands for immediate diagnosis. The health officer and his staff were plagued with countless telephone calls of outlandish purpose. Conflicting stories and false rumors, such as the "discovery" of 27 dogs in a railroad freight car which was about to leave the county, hindered control efforts and occupied the time of harried health department and law enforcement personnel and the county livestock inspector.

Numerous pet dogs and cats were dumped from automobiles in isolated areas by misguided owners instead of submitting them to more humane disposal. In the end, however, sanity prevailed, principally attributable to the effective public education program.

The first week in December, news releases to alert the public to the dangers of rabies were issued to radio, television, and newspaper media. The postexposure treatment schedules of the World Health Organization were mailed to all members of the county medical society. On December 15, in view of the worsening character of the epidemic, the Imperial County district attorney and the health officer appealed to Gov. Edmund G. Brown and to Dr. Malcolm Merrill, director, California State Department of Public Health, for help. A team of seven persons from the State department of public health staff was dispatched to El Centro, and Dr. James Cocozza, a veterinarian of the Pan American Sanitary Bureau, was recruited to aid and advise the Mexican health authorities. He received the willing cooperation of Dr. Victor Ocampo Alonzo, then health officer of Baja California.

Citizens Committee

A coordinated, countywide rabies control effort was initiated in mid-December. The county board of supervisors was again apprised of the seriousness of the outbreak and 50 law enforcement, county, city, and State officials and private citizens met on December 16. They represented the Farm Bureau Federation, civil defense, superintendent of schools, county farm adviser, agricultural commissioner, district attorney's office, county livestock inspector, municipal authorities, health department, the cattle industry, farming, urban dwellers, and the press. The result of the meeting was an acceptance of the gravity of the outbreak and a unification of official opinion and efforts for its control.

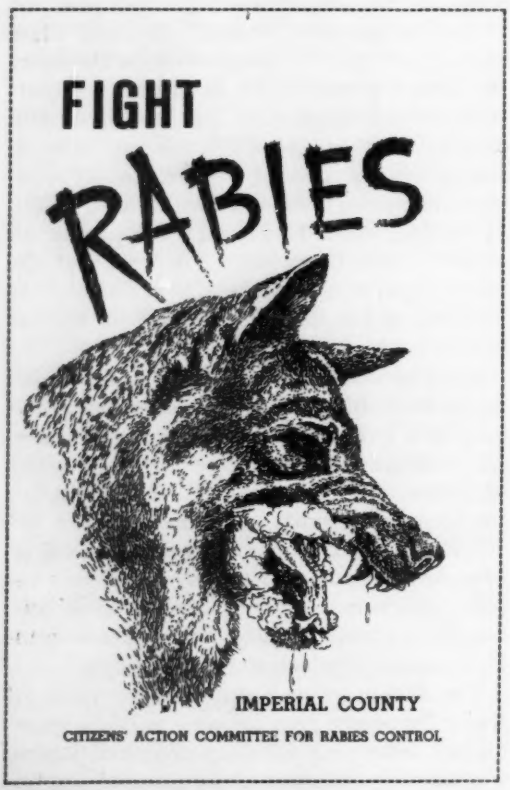
The Imperial County Citizens Action Committee for Rabies Control was organized 2 days later at a meeting called by the health officer. Its chairman was the director of the University of California Agricultural Extension Service for Imperial County. The first meeting was attended by 20 persons representing all official agencies concerned with the rabies outbreak, the parent-teachers association, county school system, farm bureau, service clubs, women's organizations, and livestock and farm groups.

The citizens action committee agreed that all law enforcement agencies were to begin immediately destroying all stray dogs and issuing citations for violations of the quarantine order. A meeting was held with the district attorney and the county superior court judges, who

agreed that severe penalties would be invoked for violation of the quarantine requirements, including nonvaccination of dogs and failure to control or confine privately owned dogs. They agreed that bail would be set at $105 for persons cited for violations of quarantine, licensing, and vaccination.

The formation of the citizens action committee marked the beginning of an all-out effort to control the epidemic. A program of public information organized by Alton Wilson, health educator, California State Department of Public Health, played a major role in turning public apathy, indifference, and resentment into a spirit of cooperation and recognition of the role of the community and the individual dog owner in control of the outbreak.

Films provided by the State department of public health, division of health education, were shown to citizen groups and through the schools.



Pamphlet distributed by Imperial County citizens committee

The health officer, the health department sanitarians, the county livestock inspector, and the chairman of the citizens action committee presented lectures and led community discussion groups to educate the public regarding the disease and the necessary measures to control it. The committee raised funds through voluntary donations to print and distribute 25,000 pamphlets which explained rabies and its control to the public (see illustration).

Other Control Measures

The county agricultural commissioner, cooperating with the State department of agriculture and the U.S. Fish and Wildlife Service, began countywide control of predatory wildlife. A total of 188 bait stations were placed, supplied with 4,400 baits at all times. Animals in the county accepted 11,400 poison baits.

At the same time, the civil defense office recruited approximately 250 men who were instructed to canvass the entire county and to shoot on sight any dog not restrained on a leash or otherwise confined. A total of 1,045 stray or wild dogs were destroyed. An additional 3,214 dogs were destroyed through routine pound operations, making a total of 4,259 animals destroyed by mid-January 1960. The city of El Centro reported in June 1960 that 709 dogs and 730 cats had been destroyed since October 1, 1959 (*5*).

On December 18, 1959, the county board of supervisors passed a resolution urging that every public agency and its officers and employees take all available steps to stop the spread of the epidemic by destroying dogs running loose in violation of the rabies quarantine and by filing complaints against persons who permitted their dogs to run loose at any time, and who failed to have their dogs vaccinated and licensed.

In addition, the board of supervisors allocated $3,475 for materials and construction of gates on the crossings of the All-American Canal to prevent movement of dogs to and from Mexico. The gates were completed in mid-January 1960. Four- by eight-foot signs posted on all highways and roads entering Imperial County notified travelers of the rabies outbreak and quarantine. Assistance was also requested

LABORATORY-PROVED RABID ANIMALS

in

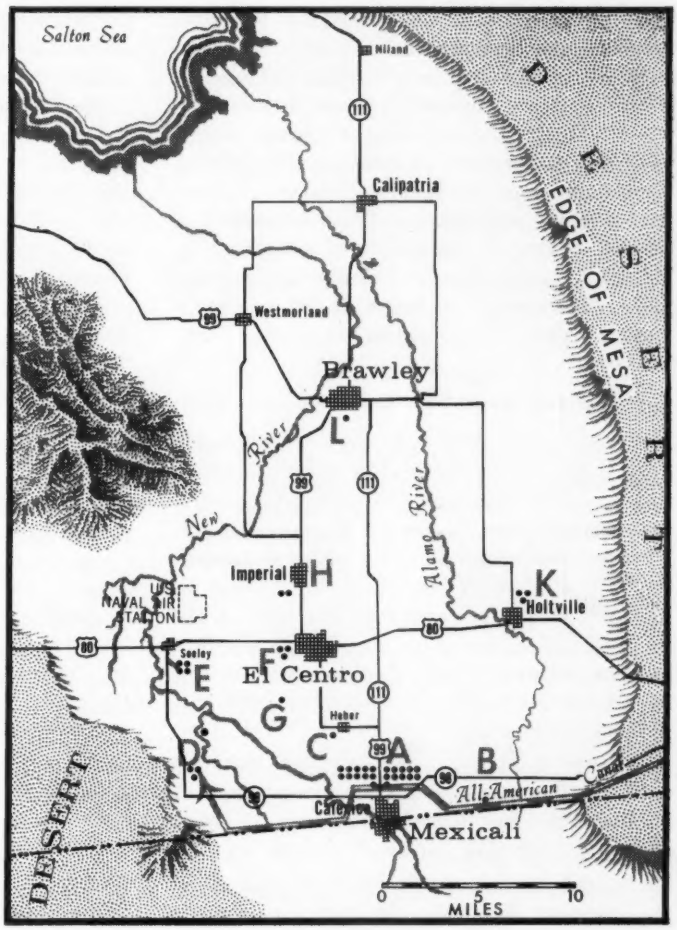
IMPERIAL VALLEY

CALIFORNIA

August 28, 1959—October 31, 1960

Each dot represents 1 rabid animal (38 dogs, 2 cows, 2 horses)

Chronology of cases	*Area*	*Chronology of cases*	*Area*
1	E	22	A
2	D	23	A
3	A	24	F
4	G	25	A
5	H	26	K
6	F	27	D
7	A	28	A
8	A	29	A
9	E	30	A
10	A	31	A
11	A	32	A
12	F	33	A
13	C	34	D
14	A	35	B
15	A	36	A
16	H	37	A
17	A	38	A
18	K	39	A
19	K	40	A
20	E	41	D
21	L	42	E



from the plant quarantine station of the State department of agriculture at Yuma, Ariz., to restrict movement of dogs.

A series of low-cost dog-vaccination clinics in rural and urban areas was conducted by Dr. G. K. L. Knott, the county livestock inspector, and private veterinarians. The location and time of vaccination clinics was coordinated with a house-to-house canvass of dog owners in all urban and rural communities. The police, fire, and pound personnel conducted the canvasses in the cities. The Imperial County Farm Bureau canvassed the unincorporated areas. Mimeographed notices allowing 5 days for compliance were issued to all owners whose pets were either unvaccinated or unlicensed.

Spot surveys covering several hundred homes each were conducted by the division of sanitation of the Imperial County Health Department in various areas to determine the effectiveness of the house-to-house canvass and the vaccination clinics. By January 15, 1960, a total of 7,782 dogs had been vaccinated, or 95 to 97 percent of the privately owned dogs of Imperial County.

The response to these various measures was effective. Virtually all stray dogs in the county had been eliminated, and almost all privately owned dogs were being restrained. The number of reported animal bites and the number of dogs submitted to the laboratory for examination were reduced to a trickle. By mid-January the epidemic was not an epidemic. No animal identified as native to Imperial County was

diagnosed as rabid either by clinical or laboratory examination for nearly 11 months.

However, on December 7, 1960, in Bard, a stray dog bit a 76-year-old man on the right wrist. The dog was shot after the attack and the State department of public health laboratory found Negri bodies on microscopic examination of the dog's brain. The man received a 14-dose course of duck embryo vaccine. He became ill 31 days later and died on January 20, 1961. Microscopic examination of his brain revealed typical Negri bodies (*6*).

Control Measures in Baja California

During June, July, and August, 1959, some 2,800 dogs were immunized in small communities east of Mexicali with a chick embryo vaccine produced in Mexico City. The vaccine lot, however, was later reported to be nonpotent (*2*). A number of the rabid dogs found in Mexicali had been vaccinated and one of the rabid stray dogs found in Imperial County during the outbreak bore a Mexican vaccination tag issued during the June–August 1959 immunization program.

Because a potent rabies vaccine was not available during the course of the outbreak in Mexicali, the Pan American Sanitary Bureau provided 5,000 doses of chick embryo vaccine from the United States to Mexicali authorities on December 23, 1959. An additional 10,000 doses of vaccine from the United States were supplied through the U.S. International Cooperation Administration on January 13 and 18, 1960.

On January 13, 1960, mass free antirabies vaccinations were initiated through the Mexicali school system and some 8,000 animals were given injections during a 5-day period. Mexicali authorities were assisted by a veterinarian and a physician from the Mexican Federal Ministry of Health, Mexico City, and by veterinarians from the Pan American Sanitary Bureau, the Public Health Service, and the California State Department of Public Health. During the clinics, the vaccination team personnel observed clinical cases of rabies in dogs either loose on the streets or in animals brought to the health department by their owners. In the Mexicali area local authorities continued vaccinating through March 12. Approximately 13,687 animals were immunized (*3*).

The Pan American Sanitary Bureau supplied 10,000 doses of chick embryo rabies vaccine from the United States to the Tijuana Health Department, and a program of pay vaccination clinics (10 pesos or approximately 80 U.S. cents) began on February 1. It is understood a total of 8,050 dogs were immunized as of August 27, 1960, in Tijuana, 720 in Tecate, and 820 in Ensenada.

As the result of the continued occurrence of rabies in the Mexicali area during March and April 1960 (50 cases, 13 confirmed by laboratory examination), Mexicali authorities again held free canine-vaccination clinics on May 9, 1960. Some 3,400 animals were reported vaccinated in the subsequent 25-week period through October 29 by Mexicali authorities. Another 1,242 dogs were reported vaccinated from November 14 to 19 (*3*).

At the time immunization was reinitiated in May in Mexicali, Baja California officials requested additional vaccine through the Pan American Sanitary Bureau and received 10,000 additional doses from ICA on June 6, 1960.

Some 35,000 doses of canine chick embryo vaccine were available for use in Mexicali and the northern part of Baja California from December 23, 1959, to June 6, 1960, and a total of 29,867 animals had apparently been immunized through November 19, 1960.

Limited destruction of dogs was attempted in Mexicali during the initial stages of the outbreak. It was reported that 1,611 animals had been destroyed during November (*2*) and an estimated 1,300 more in an attempt at large-scale destruction on the night of December 17, 1959. Limited canine destruction was continued through March 5, with an additional 2,801 dogs reported destroyed (*3*).

However, public and newspaper opinion against the step became so intense that destruction had not been resumed as of October 29, 1960, despite real need for this measure. The fact that there had been no restriction imposed against dogs in the streets and no effective reduction in dog population had undoubtedly contributed to the continued occurrence of canine

cases in the Mexicali area through November 12, 1960, in contrast to the abatement of the disease in the Imperial Valley in January 1960 (*1*).

Rabies Control Ordinance

The temporary citizens action committee in Imperial County was officially dissolved in mid-March 1960 and replaced by a permanent rabies control council. Its chairman is the county health officer and members are the county veterinarian, the county agricultural commissioner, and two members of the general public, one representing the sporting-dog groups and the other the livestock industry.

The council's status became official under a county ordinance adopted December 19, 1960, providing for the control, prevention, and eradication of rabies and the vaccination and licensing of dogs (*7*).

The ordinance establishes an annual rabies control period from January 16 to March 1. All dogs and cats are quarantined during this time; stray dogs and cats are to be captured, impounded, and destroyed; and an intensive, predatory animal control program is to be conducted by the county agricultural commissioner in cooperation with Federal and State agencies. Other provisions require that all dogs over 4 months of age be vaccinated and licensed annually and that the county veterinarian conduct a yearly series of low-cost vaccination clinics.

One section of the ordinance sets up a rabies eradication fund to which license fees and fines arising from violations of the ordinance are devoted. It also provides that at least $1,000 be allocated each year for an annual education and publicity campaign "to instruct the general public concerning the legal requirements and purpose of vaccination and licensing of all dogs."

The rabies control council and the annual control period set up by the ordinance are unique in California. It is believed that similar programs could be effectively carried out in many other counties.

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International Congress on Occupational Health

More than 45 countries, with approximately 1,800 participants, were represented at the 13th International Congress on Occupational Health held in New York City, July 25–29, 1960.

Marion B. Folsom, former Secretary of Health, Education, and Welfare, pointed out that the concept of occupational health has extended beyond mere accident prevention and occupational disease control. "Occupational and nonoccupational influences on the worker's health cannot be readily separated," he said. "Realization of this fact has led to preventive practices for total health maintenance."

"The importance of total health maintenance is reflected in the fact that 90 percent of sickness absenteeism in the United States is due to nonoccupational causes," Folsom told the congress. Mental health and human relations are now receiving recognition as integral parts of occupational health. As a result occupational health has emerged as a social as well as a medical science, uniquely qualified to deal with the worker in a changing occupational environment, he continued.

Folsom directed attention also to the shortage of trained health manpower, saying, "As employers increasingly realize the necessity of occupational health, many more personnel will be required. It has been estimated," he concluded, "that 10 industrial physicians and industrial hygiene engineers could profitably be used in the United States for every 1 now employed."

Dr. Leroy E. Burney, then Surgeon General of the Public Health Service, said the increasing emphasis on maintenance of general health in industry indicates management's acceptance of preventive medicine. Through its interest in preventive health services in industry, he pointed out, Government has signified it considers occupational health an element of public health. "This concept, I believe, holds the key to the direction in which occupational health in the United States, Canada, and Latin America is evolving," Burney said.

Despite the substantial headway that has been made in the past half century, Burney warned of many needs still existing:

1. More adequate laws governing occupational disease control.
2. Revision in the adequacy, equity, and consistency of workmen's compensation benefit structures and levels.
3. Improvement in application of preventive and restorative principles in management of industrial patients.
4. More widespread provision of second-injury funds, relieving the employer of responsibility for a greater disability than actually occurred while the worker was in his employ. (This provision would advance the hiring of handicapped workers.)
5. Increase in trained personnel: industrial physicians and nurses, and industrial hygiene engineers.
6. Accumulation of knowledge through organized and centralized reporting.

The development of the International Congress on Occupational Health, from its inception in Milan, Italy, in 1906, was outlined by Dr. S. Forssman, president of the Permanent Committee and of the International Association on Occupational Health. Though these congresses have been organized every 3 or 4 years (except during wartime), this was the first ever held in the United States.

"In order to promote occupational health," Forssman said, "it is important to find out the trends of development and to visualize problems of the near future."

Although the main progress in prevention has taken place in the field of industrial hy-

giene, development of new techniques or industrial processes cause new occupational hazards, Forssman cautioned.

Increased mechanization and automation are shifting demands on the human body from physical to mental. This change in stress calls for new studies, Forssman declared.

Another category requiring future study is the occupational health of the aging population. Forssman stressed the need to adjust work and working environment to the limits and capacities of older age groups.

Forssman especially urged occupational health services in developing countries, where large numbers are shifting from agriculture to industry and from rural areas to urban, frequently in countries with a low standard of living, short life expectancy, high infant mortality, and high morbidity and illiteracy.

Hire the Handicapped

In a study of the work performance of 77 known epileptics and all employees in four large companies, Dr. Melvin M. Udel of the Metropolitan Life Insurance Co. reported that no significant differences were found in the length of service, absence, and efficiency rates of the two groups. No lost-time accidents among the epileptics were recorded, a better than average record.

Dr. Lewis H. Bronstein of the Beekman Downtown Hospital in New York City told the congress that a 1- to 6-year followup in the hotel industry in that city revealed time lost by 93 cardiacs who had been in congestive failure compared favorably with time lost by healthy workers. About half lost no time at all, although a small number had to change to lighter duties. All these cardiacs were under medical supervision.

Part-Time Work for Women

Two disadvantages of full-time work for women are overwork and exhaustion, Rene Michon of France told the congress. These are more pronounced if the woman is married, has children, and does her own housework. He advocated half-time work in a number of industries and trades. The creation, development, and generalization of such a plan would enable more women to work, thereby raising the family purchasing power, producing a more suitable environment for children, and increasing the national production potential, Michon said.

Inpatient Training

Because many skills and trades required in operating a hospital are identical with jobs available in the community, Dr. Robert H. Manheimer of the New York State Chapter of the Arthritis and Rheumatism Foundation suggested that a suburban hospital can adapt its services to furnish vocational rehabilitation to physically handicapped residents. Through the addition of a vocational counselor and training supervisor, the hospital's operating departments can be used for evaluation and training. In a 14-month period at one hospital, 51 of a total of 91 cases of physically handicapped ambulatory patients referred from the hospital and other agencies were closed; 29 clients obtaining employment in commercial or industrial jobs at earnings ranging from $40 to $75 per week.

Union Hygiene

The safety and health of workers in England are protected by "shop stewards," known as watchdogs of the trade unions, from the first day of their employment, according to James Matthews of the National Union of General and Municipal Workers in Surrey. Trade union officers know by experience which employers can be relied on to observe rules and regulations and those who are prone to disregard even elementary safety precautions. The majority of convictions for violation of the factory act have been brought about by vigilance of the trade unions, Matthews said.

The unions believe that both employers and employees should foresee risks and take necessary precautions. They insist safety must be a definite aim, and there must be the will, organization, and resources to secure it. They recommend the availability of full facilities for the treatment of workers laid off through accidents or ill health, and rehabilitation

courses to speed recovery and return to full employment.

Safe Drivers

In setting out a medical guide for physicians in determining fitness to drive a motor vehicle, Harold Brandaleone, chairman of the Committee on Standards for Motor Vehicle Drivers of the Industrial Medical Association of New Jersey, pointed out that only the physician can ascertain the physical, mental, emotional, and physiological impairments of an individual and evaluate these disabilities in relation to safe driving. The commercial vehicle driver should be examined every 2 years up to age 45 and every year thereafter, he said. Other drivers should have an examination every 3 years up to age 45 and every 2 years thereafter. Personal characteristics, emotional disturbance, fatigue, and use of drugs and alcohol are to be considered as well as physical conditions, such as vision; otolaryngological problems; and cardiovascular, metabolic, and neurological diseases.

Suicide Prevention

As a cause of death among industrial workers, suicide ranks third behind cardiovascular diseases and accidents. A high percentage occurs in the years of greatest potential productivity, said Dr. Mac Roy Gasque of the Olin Mathieson Chemical Corp. of North Carolina. Statistics from authoritative agencies emphasize higher frequency of suicide among industrial workers than among the general population. Identification of the suicidal personality and recognition of the prodromal signs and symptoms can be made by the industrial physician who can save the lives of many industrial workers.

Bladder Cancer

A small group of compounds responsible for the occurrence of bladder cancer in dyeworkers has been identified as aromatic amines with the paraposition blocked by an aromatic group and includes 4-aminobiphenyl, benzidine, and 2-naphthylamine. Of the species studied so far, according to Walter Troll, only human beings and dogs are susceptible. The active carcinogen is a urinary metabolite. Orthohydroxylated amines are carcinogens on the tissue level where amines are inactive. Investigation has revealed an unusual metabolite of 2-naphthylamine in human beings and dogs, a phosphate ester of the orthohydroxylated amine. Such a compound is a promising candidate for the role of the active carcinogen because this material is found only in urine of the two species, and there is ample presence of phosphatases in urine and bladder mucosa, and rapid localization in the bladder mucosa when phosphate esters are injected into the bladder of rats.

Hospitals and the Public Interest

MAX SHAIN, M.P.H., and MILTON I. ROEMER, M.D.

IN 1958 the insurance commissioner of Pennsylvania issued a now-famous adjudication on the application of the Philadelphia Blue Cross plan for a premium increase (*1*). In explaining his refusal to grant the increase, the commissioner offered a bill of particulars on the operation of both Blue Cross plans and hospitals, suggesting widespread neglect in the control of hospital utilization and costs. In the following months, official investigations were launched in several States on the whole question of hospital management and economics.

The first reaction to these signs of strong governmental intervention into hospital affairs was one of surprise and indignation. What right did an insurance commissioner have to suggest that either a Blue Cross plan or a governmental agency should pry into the operation of institutions that were predominantly under local voluntary auspices? Charges were made of "attacks on the voluntary hospital system" and creeping socialism. At about the same time, Cornell University was called on by the State of New York to help prepare new legal standards for the approval of general hospitals, and we were likewise attacked as accomplices in the crime of governmental interference with free hospital enterprise (*2*).

As the dust has settled, it has become clearer to many that hospitals in the United States are, indeed, subject to various forms of supervision by public agencies. Yet many look at the trends with anxiety. It may help to clarify the changing hospital world if we examine the basis of public interest in hospitals, the voluntary safeguards of this interest, the role of government, and new issues of public concern. Then we may be able to look ahead to future needs for reasonable supervision of hospitals in the American scene.

The authors are with the Sloan Institute of Hospital Administration, Graduate School of Business and Public Administration, Cornell University, Ithaca, N.Y. Mr. Shain is assistant professor of hospital administration, on leave of absence, and Dr. Roemer is associate professor of administrative medicine.

Basis of the Public Interest

What is the basis of the public interest in hospitals? Fundamentally, it lies in the obligation of the community to protect the health of its members. This responsibility is dispatched through both voluntary and governmental actions. Through a long tradition of political experience and legal precedent, some (though not all) of this theoretical obligation of government is embodied in constitutions. The U.S. Constitution may not spell out "hospitals" or even "health" as subjects of governmental concern, but the "general welfare" clause has been interpreted again and again to include within it the power to safeguard the public health. Except for foreign or interstate activities, however, power in health affairs rests essentially with the State governments. The New York State constitution, for example, states that "the promotion and protection of the health of the inhabitants of the State are matters of public concern."

The States are amply endowed legally to support this public concern. They possess what is called juridically "police power," permitting State governments to protect the health, welfare, safety, and morals of their citizens. The rational foundation of this power may be the need to protect individuals from the harmful acts of others or even from personal imprudence. Hence the State exercises its police power over the sale of drugs or the wages and hours of working people. It may require vaccination against smallpox and quarantine of per-

sons with diphtheria. Likewise it may regulate hospitals since these institutions may intimately affect the life and well-being of the people.

Beyond these philosophical and legal foundations for a public interest in their operation, hospitals derive from the State certain special privileges. At the same time, the State imposes certain obligations on them.

Generally hospitals are incorporated bodies, chartered by the State like other corporations. Directors are substantially relieved of individual responsibility for the wrongdoing of the corporation; instead, the legally created corporate "person" is responsible and liable only to the extent of its collective assets. Considering the possibilities of negligence, harmful acts, and malpractice suits in a hospital, this limited liability is obviously of great importance. As corporations, hospitals have the capacity for perpetual existence, without the necessity of complex transfers of title on the death of individual founders. The responsibilities of corporations are defined by law and are subject to a charter granted usually by the secretary of state in each State (*3*).

Because of their usually charitable and nonprofit character, except for the handful of proprietary institutions, hospitals enjoy tax exemptions of many sorts. They are exempt from Federal income taxes and from many excise taxes levied on other enterprises. They are also exempt from local property taxes, and often from local sales taxes on their purchases. Moreover, hospitals may receive gifts from donors who thereby enjoy reductions of their net incomes for tax purposes; hospitals thus receive funds which would otherwise be payable in large part to the government as private income taxes.

Hospitals may receive substantial grants of public money for construction purposes. The extent, of course, differs with the hospital's sponsorship. About one-third of the hospitals in the United States are fully owned by units of government, predominantly State and local, and were built entirely with governmental tax funds. Even excluding special hospitals for tuberculosis and mental disorder, Federal facilities for veterans or merchant seamen, and all long-term facilities, and counting only short-term general hospitals serving local communities, there are more than 1,100 such institutions which have been built substantially from public funds. Beyond this, voluntary hospitals have long received governmental construction grants. Such support has been given since the earliest days of the Republic, when the Pennsylvania Hospital in Philadelphia and the Massachusetts General Hospital in Boston received grants from State legislatures and municipal governments. State governments have in more recent years given such grants to help hospitals in rural communities. Since 1946, of course, the Hill-Burton program has provided substantial Federal money to assist voluntary and public hospital construction on a nationwide scale. Such contributions of public funds have entailed public responsibility for overseeing how the money is spent on the physical plant.

Governmental units purchase services from hospitals on behalf of certain legal beneficiaries. The largest share of these are indigent persons receiving public assistance from State or local governments; that is, recipients of categorical or general assistance. In addition, many States assume responsibility for hospital services to selected persons who are "medically indigent"; that is, unable to pay hospital bills although not on the relief rolls for their general living needs. The new Federal law on medical care for the aged, enacted in September 1960, may enlarge this group considerably. Then there are a variety of other beneficiaries of governmental programs, such as those for workmen's compensation, vocational rehabilitation, or crippled children, who are ordinarily treated in community hospitals. Finally, there are beneficiaries of the Federal Government, ordinarily served in special Federal hospitals, who may receive care in local general hospitals on occasion; these include veterans, uniformed service dependents (the "medicare" program), American Indians, and others. The content of care given to all these beneficiaries is a matter of public concern. In some States, indeed, it is the principal legal foundation for the whole licensure program, with responsibility being assigned to the welfare department because of its authority for overseeing care to the indigent.

Another foundation of public interest in

hospitals is their provision of a locale for the work of several licensed health professions. Physicians, nurses, physical therapists, technicians, and others who work in hospitals individually derive their rights to practice from special examinations and licensing procedures. But the very concentration of these personnel under one roof would seem to place a special responsibility on government regarding the technical standards of the environment under that roof. Surveillance over the management of affairs of hospitals provides a channel for some continued assurance of proper performance by these professions, after the initial licensure.

The hospital is also an educational institution, most conspicuously for nurses but also for other occupations. Laboratory technicians, rehabilitation therapists, social workers, dietitians, and pharmacists may receive substantial parts of their basic training in hospitals. Physicians are educated in hospitals throughout their professional lives, not to mention their periods of service as interns and residents and their training years as medical students. Insofar as supervision of education is widely considered a public responsibility in our society, the hospital is partly a school requiring such supervision.

The hospital, furthermore, is an employer of men and women, subject accordingly to the laws of the land controlling the conditions of labor. Exemptions may be made regarding certain wage, hour, and collective-bargaining provisions because of the hospital's usually nonprofit character, but such exemptions are a matter of legislative decision rather than constitutional right. The exemptions could be withdrawn and, as we shall note, there are legislative winds blowing this way. In any event, conditions of work in hospitals are obviously matters of public interest, with about 1,500,000 persons employed in them on a full-time basis.

Finally, there is the question of hospital operating costs, which have obvious importance for the general public. In recent years, public concern about this has become an overriding issue. Not only has there been widespread popular reaction to the sharp rises in hospital costs, but the channel of expression of this reaction has been widened through a separate but closely related social movement: hospital insurance. The Blue Cross plans inevitably reflect hospital costs in their premium charges to subscribers. Being insurance organizations, though nonprofit, they come under the supervision of State insurance commissioners, and these officials must be responsive to public attitudes. Thus, the insurance financing of a major share of hospital costs in recent years—in other words, support by the mass of people rather than solely the sick—has heightened public interest in hospital costs. Obviously, the people have a right to know how their insurance money is being used by hospitals; if there is inefficiency or extravagance, they have a proper concern in eliminating it.

These, then, are the principal reasons for a public interest in hospitals. Perhaps it epitomizes the situation to say that hospitals are essentially public utilities. They are so important to the survival of the community that they have been granted many special immunities and statutory rights. At the same time, their actions may lead to good or poor consequences for the people. For both reasons, citizens and organizations outside the walls of the hospital have assumed a variety of responsibilities for looking in on them and exerting various pressures to assure proper performance.

Voluntary Safeguards

Consciousness of public interest is responsible, at least in part, for the conventional pattern of a board of directors as the top authority of each general hospital. The hospital board is theoretically a kind of built-in protector of the public interest. Its roster is supposed to include persons who represent the community: if not popularly elected, then appointed on the basis of their position as leaders able to judge the interests of the population as a whole.

In practice, we know that the democratic ideal is rarely attained anywhere. Hospital boards may be composed of highly intelligent and responsible persons, but they come predominantly from business and professional groups (*4*). Their sensitivity to the needs of humble people may be limited, and their willingness to take particular actions may be strongly influenced by their personal views,

which may or may not coincide with maximum protection of the public interest. Moreover, they are often persons who have given substantial donations to the cost of building the institution; hence, they will feel proud and possessive toward it, protecting it against criticism. An attitude of "my hospital, right or wrong" may assure loyalty but not necessarily optimal performance for the general good. These observations should not deprecate the devotion and diligence of most hospital board members, but they do cast doubt on the reliability of the board mechanism for protecting the public interest.

Yet every decision that a hospital board or its administrator makes is laden with public interest. The hospital's handling of funds, its maintenance of the physical plant, its appointment of personnel, its provision of technical services, its policies of staff organization—all affect the adequacy of care given by physicians and others. Not that every decision should be subject to review by a higher authority, but the overall effect of these decisions—or failures to make decisions—is manifestly of great public concern.

There are other boards of citizens at the local level that may examine aspects of hospital operation from time to time. Community chests or councils may look into how funds they have granted are spent. Blue Cross boards may indirectly call for economies. Governmental agencies buying services for various beneficiaries may demand that certain standards be met. But the focus of each of these groups tends to be narrow and their impact is limited.

To provide more general surveillance over hospitals, a number of national nongovernmental associations have taken action. The first such body of wide impact was the American College of Surgeons which, shortly after World War I, developed a nationwide system for approval of hospitals meeting certain standards of organization and practice. Meanwhile the American Hospital Association established limited standards for membership and "listing" in its annual roster. The American Medical Association, through its Council on Education and Hospitals, developed a system of approval of hospitals for internships, residencies, and postgraduate education. Special approvals for such services as tumor clinics, blood banks, and schools for X-ray and laboratory technicians were given by other professional societies or voluntary agencies.

These specialized approvals, on the whole, continue, but in 1952 there was organized an overall system of hospital "accreditation" by a joint commission made up of representatives of the American College of Physicians, American College of Surgeons, American Hospital Association, American Medical Association, and the Canadian Medical Association. This commission undertakes inspections throughout the Nation and has doubtless had a major effect in upgrading hospital performance. The prestige of accreditation has come to be regarded as an essential asset in a hospital's public relations. Withdrawal or the threat of withdrawal of accreditation provides a strong incentive to improve practices. In contrast to the State government licensure systems, the main emphasis of the joint commission's work is on medical staff practices, although a comprehensive review is made.

Despite the notable achievements of these voluntary bodies, their shortcomings must be recognized (*5*).

- They are voluntary and no hospital need even apply for their approval; indeed, some of the marginal institutions, in greatest need of improvement, avoid the whole process. Even if an institution seeks approval and fails to get it, there is no penalty except nonapproval. In a one-hospital community, without "competition" for patients, this moral penalty may have little effect.
- The Joint Commission on Accreditation makes a policy of examining only hospitals of 25 beds or more. Yet 800 hospitals in the United States are smaller than this, and these institutions may present the thorniest problems. The Georgia Hospital Association and the Georgia Department of Public Health have been unusual in launching a special accreditation program for these small units.
- These professional societies and commissions are, of course, independent and responsible only to themselves.

While their integrity may be beyond question, they do not unfailingly reflect the public interest. Their viewpoint, indeed, is sometimes

parochial; they avoid inspection and accreditation of osteopathic hospitals, for example, despite the fact that these institutions give care to thousands of patients. In the recent contentions between radiologists and hospitals about schemes of organization, these professional societies have stood aloof, not lending their weight toward whatever side they judge to be in the public interest.

In the light of these shortcomings in voluntary mechanisms for protection of the public interest in hospital operations, and in spite of their enormous positive achievements, there remains in a democratic society an overriding need for public supervision of hospitals. Only through governmental authorities, responsible ultimately to the whole people, can this supervision be fully and effectively exercised. The responsibility of government is carried out through the political process. This process in turn, has been increasingly fortified by merit systems for appointment of officials, especially in technical fields. Government agencies may solicit and receive expert advice from many sources, but the final policy decisions must rest with the agencies. They are ultimately accountable to the citizenry, who can vote the top policymakers out of office if dissatisfied. Governments have, in summary, not only the power but also the obligation to protect the public interest.

Role of Government

The principal means by which governmental agencies have come to protect the public interest in the operation of hospitals is through licensing by State authorities. The laws defining this power are relatively new. Before 1945, only 10 States had any form of hospital licensure law, the exercise of public surveillance being confined principally to the State licensure of physicians and other health personnel working in hospitals. The Federal Hospital Survey and Construction Act of 1946, however, was enacted in a period when consciousness of the public interest in hospitals had matured. It contained therefore a stipulation that every State receiving Federal grants for aiding in hospital construction should have a law governing minimum standards of maintenance and operation for at least the subsidized facilities. In time, every State passed such a law, and in all but two States, Delaware and Louisiana, it has come to be applied to all hospitals in the State (*6*).

In these State laws, the legislature usually declares that every hospital must have a license granted by a particular State agency, typically the health department. The health department is authorized to issue regulations to carry out the legislative intent, which is usually broadly defined. The Missouri statute, for example, declares it to be the legislative purpose to "provide for the development, establishment, and enforcement of standards (1) for the care and treatment of individuals in hospitals and (2) for the construction, maintenance, and operation of hospitals, which, in the light of advancing knowledge, will promote safe and adequate treatment of such individuals in hospitals," and authorizes the Missouri Department of Public Health and Welfare to adopt, amend, promulgate, and enforce rules to accomplish the purposes of the law (*7*).

The adoption of such a statute represents a forceful exercise of the police power of the State. It grants to the public authority the power to determine the precise conditions under which a hospital shall be operated. If anyone sets out to operate a hospital without meeting these standards, he is subject to prosecution. While these powers are seldom invoked, their existence strengthens the effectiveness of suggestions for improvements made by State agencies.

With such sweeping powers at their disposal, State agencies are faced with many delicate questions about the scope and content of regulations that they adopt. To what precise aspects of hospital operation should the regulations apply? How detailed and specific should they be? Should the regulations tolerate mediocre or second-best practices, so long as they are not proved to be harmful, or should they set more rigorous requirements? Should there be a "grandfather clause" in hospital regulations, permitting more lenient standards for old institutions than for new ones? Should different standards be accepted for large hospitals and small ones, merely because of their size or because of their differing roles in a regional network? In all these questions, the technical con-

siderations must be blended with political judgments. Government officials must decide how far public understanding will support their actions.

The older State hospital regulations tended to construe their authority narrowly. Their attention was concentrated on protection of the safety of patients; they were explicit about details of the physical plant, including such items as fireproof construction, number and location of exits, the maintenance of buildings, and so on. Details of water supply and sewage disposal were also spelled out, in the older public health tradition. Public concern for mothers and babies has also been expressed in special requirements for hospital maternity departments.

The newer State hospital regulations are concerned with much broader aspects of hospital organization. There are requirements on the functions of a governing board and administrator, on the medical staff organization (bylaws, selection of physicians, restrictions, and so on), on detailed clinical records, on the laboratory and X-ray departments, on the nursing service, dietary management, and so on. A few State agencies have ventured into the ticklish problem of requiring admission-discharge control committees. There are also, of course, requirements on physical plant and sanitation. In short, the scope of the hospital licensure regulations in most States today is broad enough to determine whether the hospital is built, organized, equipped, and staffed in a manner adequate to do the job expected in modern society (*8*).

The writing, interpretation, and enforcement of hospital licensure regulations, however, are not simple matters. To strike a compromise between the ideal and the practical, it is common for licensure codes to set out certain standards as mandatory while others are simply "recommended." The mere official publication and discussion of the recommended standards serve to encourage higher levels of hospital performance. From time to time a recommended standard will be changed to a mandatory one, so as to promote improvement of hospitals at a realistic pace.

Quite apart from a deliberate objective of the State licensure agency to encourage improvements, standards must be reviewed continually to be certain that they reflect changes in scientific knowledge. Some 10 years ago, for instance, hospital standards stressed the need for ample oxygen for premature infants. The discovery of the danger of producing blindness, retrolental fibroplasia, by providing too much oxygen to premature babies required a quick shift in the licensure standard. The emphasis is now placed on controls to assure a precise concentration of oxygen.

Some might ask, however, whether the licensure standard should not be stated in terms general enough to eliminate the need for frequent amendment. Would it not be easier, for example, to have regulations simply state: "Where premature infants are cared for, a supply of oxygen appropriate to their needs shall be provided"?

The doctrine of generality in licensing regulations unfortunately is deficient on both legal and practical grounds (*9*). Primarily, a regulation with the force of law must be specific and clear enough to enable the person or organization being regulated to know what he must do to comply and what he must not do to avoid violation of the law. What guidance is offered to Oklahoma hospitals, for example, by the State regulation that "sufficient registered nurses shall be employed to assure adequate care of patients"? Even if our stage of knowledge does not permit absolute standards on many subjects, certain bare minimum levels may be stipulated. A requirement that "at least one registered nurse for each 20 (or 40 or 50) patients shall be provided by the hospital" can be understood and can be helpful.

The importance of specificity in hospital regulations is heightened by the realities of law enforcement in this field. Even the best manned State hospital supervising agency, with the most competent staff, could not inspect hospitals frequently enough to assure absolute compliance with the regulations. In a field of service with the high moral purpose of hospitals, moreover, such policing would be repugnant and unnecessary. The issuance of the regulations is ordinarily enough to induce compliance, but only if the standards are clearly stated. If they are open to varying interpretations, not even the best hospital can be certain

how to comply, while the poorest may take refuge in their vagueness.

A troublesome aspect of hospital regulation arises from the frequent multiplicity of regulatory agencies in a State and from inconsistencies in the rules issued by each of them. In New York, for instance, general hospital regulations are issued by the State board of social welfare. Specific rules, however, on newborn nurseries, vital statistics, communicable diseases, laboratory and radiology departments, and the handling of cadavers are issued by the State health department for hospitals outside New York City; still other rules on these subjects for hospitals in New York City are issued by the city health department. Educational programs in hospitals are regulated by the State board of regents. State and local fire regulations, multiple dwelling laws, and zoning ordinances affect hospitals through still other jurisdictions.

There are complex historical reasons for this dispersal of authorities for hospital supervision in State governments, not to mention delegations of certain authorities to local governmental units. The intricacies of government are exasperating not only to the population at large but to public officials themselves. Reorganization commissions at the Federal and State levels have attempted to streamline public administration for years, and the task is never ending. There are some, of course, who emphasize the benefits of dispersed governmental authorities as a protection against political czarism. At the same time, in the hospital and health field splintered authorities tend to weaken the effectiveness with which public agencies can protect the public interest.

There are other reasons, however, why many State hospital licensure programs are less effective in practice than they would appear by studying the language of the written regulations. The responsible agency tends to be meagerly financed and staffed. The qualifications of licensure personnel are often modest. Most States seem to rely heavily on registered nurses, whose competence outside the field of nursing care is often limited. At bottom, perhaps, there is a certain hesitation on the part of State governments to pry too closely into the affairs of voluntary institutions associated with so distinguished and ethical a tradition as that of the medical profession and the community hospital.

But the public interest in hospitals, as we have noted, remains wide and is growing wider. The need for effective programs of governmental supervision of hospitals is more pressing than ever, not only because of the greater demands of the public for the highest technical performance in matters of life and death, but because of a number of issues that have become especially prominent in the last few years.

New Issues of Public Concern

Back of the problem of sharply rising hospital costs, mentioned at the outset, are a series of questions demanding action on a broad community basis. The widespread financing of hospital care through insurance has extended the interest in these questions from individual hospital boards to the population as a whole.

One of these new questions concerns the whole level of hospital utilization in a population that is heavily insured. Are hospitals being overused by some patients and some doctors so that the costs rise for everyone? This is a complex question on which there has been a good deal of confused thinking. If there is any improper use of expensive hospital beds, one must be cautious about accusations, since such usage always involves the concurrence of three parties—the patient, the physician, and the hospital. The forces acting on each are manifold (*10*). An approach to the problem calls for discipline by physicians on hospital staffs; their judgment on the use of a given bed is decisive. Is there not a place in hospital regulations therefore for some procedure, such as a designated medical staff committee, to assure the proper admission and discharge of patients, so that costly hospital beds are soundly utilized? (The establishment of such a committee in every Blue Cross participating hospital was, in fact, required by the 1958 decision of the Pennsylvania insurance commissioner.)

Closely related to the use of hospital beds is the issue of their supply and location. Strangely enough, no State now exercises control over this basic question. The licensure laws specify that a hospital to be constructed

must meet certain standards, and if these standards are met, the hospital must be licensed. The State agency may not examine whether the additional hospital beds are needed, except for the minority, about one-fourth, of hospitals receiving Federal construction funds. Yet studies in the United States and elsewhere have shown that the most fundamental determinant of the expenditures of a Nation or a State for hospital service is the supply of beds provided. The beds that are there tend to be used (*11*).

We are not suggesting that too many hospital beds are available and that further construction should be stopped. Far from it; in fact, we believe that a proper meeting of health needs probably demands a higher ratio of beds to population than we now have, especially of beds for the aged. But we are suggesting that any effective public control over expenditures for hospital service by the population as a whole requires a conscious and deliberate control over the supply of beds in a State. This policy has been recommended by some in terms of a "franchise" to be issued by a public agency for hospital construction or extension (*12*). Others have called for issuance of approval for all new hospital construction by regional councils set up under State law (*13*). However it may be done, the need for some type of governmental control over the supply and location of hospital beds in a State seems to be increasingly accepted.

A third current issue relates to the policies of hospitals on appointment of physicians to their medical staffs. It is well-settled doctrine that the governing board of a voluntary hospital has the authority to permit or deny physicians the right to practice in the institution. There are sound technical reasons for hospital boards to limit the privileges of attending physicians by barring them completely or by defining more narrowly than the State medical licensure laws what they may do within the institution. At the same time the U.S. Supreme Court and other courts have held it illegal, under the antitrust laws, for medical societies to exert pressure on hospital boards to exclude physicians from hospital staff appointments because of their economic patterns of practice. This issue has arisen several times with respect to denial of hospital privileges to technically qualified physicians engaged in prepaid group medical practice—most recently in Staten Island, N.Y. (*14,15*). Is there not an important question of public policy involved, insofar as the patients of these doctors may need hospital care and the patients are, indeed, contributing to the support of the hospital through insurance payments? Should not a public agency be prepared to protect the public interest in an issue of this sort?

A fourth issue relates to the use of drugs in hospitals. Recent investigations by a U.S. Senate subcommittee into the prices of brand-name drugs have led to a renewed interest in the application of formularies calling for the use of generic-name drugs wherever feasible. Yet, in Pennsylvania, a hospital pharmacist was penalized for filling a prescription with a generic-name form of a drug rather than with the brand-name form of the same drug, as prescribed by a physician. His hospital's official formulary stipulated use of the generic form (*16*). The right—or perhaps even the obligation—of hospitals to use drug formularies would seem to be a matter of clear public interest that ought to come within the purview of State licensure regulation.

A fifth issue concerns labor standards. Although employees of voluntary hospitals do not have the protection of the Federal wage-and-hour standards, they may be covered under the State laws. In 1960, the minimum wage law of New York State, for example, was amended to cover the employees of nonprofit corporations, including hospitals. Unless specific exemptions are ordered by the State industrial commissioner, these employees will shortly be paid a minimum wage of $1 an hour. In a number of States, furthermore, the right of collective bargaining through hospital unions is protected by law and may be enforced by State labor agencies (*17*). The public interest in these fields has been justified on two grounds: first, to assure decent wages for all persons working in the State; and second, to assist hospitals in maintaining a qualified and stable working force in a competitive labor market.

There are doubtless other issues in today's hospital cauldron, but these may be enough to explain the heightened relevance of hospital affairs to the general public interest. All of

these questions affect the costs of hospital care, which almost everyone must now finance. They likewise affect the quality of hospital care, which ultimately influences the life or death of patients. There are, indeed, a wide range of professional measures which may be taken to encourage top-quality performance—t i s s u e committees, medical audits, postgraduate education—in certain hospitals. While the administrative task might be complex, would it not be appropriate protection of the public interest to require such measures to be undertaken in all hospitals?

Future Needs

Perhaps to some this sounds like advocacy of an unreasonable extension of governmental authority over voluntary hospital affairs. We can only say that the issues have arisen not from any hunger for authority by public officials, but rather from the experiences and reactions of the general public. Hospitals are becoming more and more important to people, both for their services and their costs. And their conduct acquires therefore the attributes of a public utility, which cannot be left solely to the prerogatives of its managers but requires the increasing surveillance of a public authority. While voluntary discipline can and does reduce the need for governmental controls, an ultimate need for them remains.

Others may regard the delegation of such wide authority to government as unrealistic. What State agency, they may ask, can command the skills necessary to provide the wide scope of supervision called for? Admittedly, there is no State agency now equipped to do the job. It is small wonder that, with their present meager staffs, the State hospital licensure agencies have so often concentrated their attention on the details of physical plant and safety inspection. It is small wonder that, in their present role, hospital licensure authorities have been regarded rather casually by hospital administrators, and the impact of these authorities has been felt to be slight (*18*).

A properly staffed and authorized State agency for hospital supervision, however, could be equal to the responsibilities which the times demand. A beginning has certainly been made in a few States which have taken seriously the language of their licensure codes (*19*). In one of the Canadian Provinces with a program of hospital insurance encompassing its entire population of about 900,000, there is a division of hospital administration and standards with 23 professional personnel. These include a medical director and consultants in general hospital administration, nursing, dietetics, pharmacy, radiography, laboratory technology, social work, problems of physical plant, accounting, auditing, and health education. In addition there are part-time consultant services provided by other departmental personnel in sanitary engineering, architecture, medical records, and statistics. Records of the Saskatchewan Department of Public Health, Regina, Canada, show that the cost of maintaining this supervisory staff, in relation to the costs of the hospital service itself, is only a drop in the bucket.

In 1957, the American Hospital Association undertook a study to determine an appropriate range and qualifications of staff for State agencies responsible for supervising hospitals. The results do not seem to have been published, but preliminary documents suggested a need for much more comprehensive staffing than prevails anywhere (personal communication from Hilary Fry, January 15, 1958). Not that such staffing would imply a corps of rugged inspectors to crack the whip over hospital administrators. On the contrary, the goal of a State hospital licensure agency must be to upgrade performance and encourage excellence—not to punish or intimidate. To do this, official personnel must play the role essentially of consultants, advising hospitals on how to meet, or surpass, the legal standards and how to continually improve their services within a framework of maximum economy. There is no reason, incidentally, why much of the advice, now purchased at high fees from private hospital counseling firms, could not be given freely by a really sophisticated staff of technical consultants in a governmental agency. This is the custom in Canada and Europe.

To back up the actions of the hospital licensure staff—or perhaps we should call it the supervisory and consultant staff—the official regulations should come to grips with the significant problems of hospital operation in the

20th century. Here is a list of the 17 chapters in a proposed set of hospital standards which our institute recently drafted at the request of the New York State Department of Social Welfare:

Administrative organization and services.
Admission and discharge of patients.
General clinical services.
Anesthesia and inhalation therapy.
Laboratory services.
Physical medicine and rehabilitation.
Dental service.
Nursing service and patient accommodation.
Outpatient and preventive services.
Pharmaceutical service.
Medical social service.
Medical records and library.
Educational activities.
Dietary services.
Sanitary functions.
Physical plant.
Special hazard problems.

Regulations of this breadth should not be drawn up unilaterally by a State agency. They should be drafted in consultation with representatives of the hospitals. They should obviously be revised at frequent intervals. Their application by the staff, moreover, should be strengthened by the support of an advisory council representing the hospitals, the health professions, and the general public. An important step in the direction of strengthening the overall State programs of hospital licensure was taken by the formulation of "recommended principles" in this field by the American Hospital Association in May 1960 (*20*).

With proper legal standards and with staffing to apply them, the farflung public interest in hospitals could be adequately protected. Many of the problems that now beset hospital boards and administrators could be reduced. The public would be set at ease in its suspicions about waste or inefficiency in hospital management. The patient would be reassured about the quality of service, not just in those institutions that are manifestly excellent, but in all institutions. The rights of the community to have the best quality hospital service at the lowest feasible cost would be steadily advanced.

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Relative Merits of Aqueous and Adjuvant Influenza Vaccines *when used in a* Two-Dose Schedule

ALBERT V. HENNESSY, M.D.
FRED M. DAVENPORT, M.D.

A RECOMMENDATION that persons of all ages be vaccinated against influenza by giving them two doses of vaccine was first made in 1957 by the Commission on Influenza, Armed Forces Epidemiological Board. This recommendation stemmed from the demonstration that the primary antibody response of man to influenza virus vaccines seemed inadequate. For example, infants and children respond irregularly and poorly to a single dose of influenza virus vaccine (*1–5*). Young adults and persons over 30 likewise fail to develop uniformly high antibody levels when vaccinated once with those strains of influenza virus which they have not previously encountered by infection (*2,6–8*).

Fortunately, it had been clearly established that vaccination was capable of laying the foundation for a "booster" response in children and adults (*3,4*). Hence, in order to meet the emergency when the antigenically novel Asian strains appeared in 1957, the recommendation of a two-dose schedule of vaccination could be made with confidence.

Since 1957 a schedule of two doses of influenza virus vaccine for protection against influenza has been adopted by the military and recommended to segments of the civilian population (*9,10*). Meanwhile, general interest has accumulated in the use of those adjuvant influenza virus vaccines emulsified in mineral oil that have been under development since 1951 by the Commission on Influenza. Consequently, it seems timely to report on the results of a series of investigations undertaken to compare antibody responses of humans given either two doses of aqueous vaccine, two doses of adjuvant vaccine, or one dose of vaccine of one kind followed by a second dose of the other kind.

The findings indicate that mineral oil adjuvant vaccine, when used as one or both inoculations in a two-dose schedule, is remarkably effective for stimulating high, broad, uniform, and persistent antibody levels against prototype strains of influenza A viruses, regardless of prior natural exposures. Furthermore, when two doses of adjuvant vaccine are given within an interval of 2 to 3 months, a

The authors are with the virus laboratory, department of epidemiology, University of Michigan School of Public Health, Ann Arbor.

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phenomenal economy can be effected in the requirement of antigen.

Materials and Methods

The vaccines used in the study were prepared through the courtesy of commercial biologics firms. Concentration and purification of virus were accomplished by centrifugation. Virus suspensions were inactivated with formalin (1:4,000), and merthiolate (1:10,000) was added as a preservative. Adjuvant vaccines were made by emulsifying one volume of virus concentrate with an equal volume of a mixture containing nine parts light medicinal mineral oil (Drakeol 6–VR, Pennsylvania Refining Co.) and one part emulsifier (purified Arlacel A, Atlas Powder Co.). These adjuvant vaccines are experimental products and are not commercially available.

A volume of 0.25 ml. of adjuvant vaccine was given intramuscularly in the posterior belly of the triceps muscle. Aqueous vaccine was administered subcutaneously in 1.0 ml. doses.

Except in one instance, antibody response to vaccines was studied in young children aged 4 to 11 years (median, 8 years) and in adults 30 or more years of age (median, 45 years). The exception was a series of experiments conducted between December 1956 and April 1957 on four groups of children 11 to 16 years of age to determine the minimal amount of virus necessary for a satisfactory booster response after an initial dose of adjuvant preparation.

The serum was promptly separated from each blood sample and merthiolate (1:1,000) was added to yield a final concentration of 1:10,000. Serums were stored at 4° C. and heated to 56° C. for 30 minutes prior to use. For measurement of antibody against Asian virus, serums were treated with two parts M/90 KIO_4 for 12 to 18 hours at 4° C. Excess periodate was then neutralized by addition of five parts of a 10 percent solution of glycerol in saline.

Hemagglutination inhibition activities of serums were determined by a pattern test with four units of virus and 0.5 percent chicken erythrocytes suspended in saline (*11*). Antibody titers are expressed as reciprocals of initial dilutions of serums.

Strains of influenza virus used for vaccination and for antibody determination were chosen from the virus collection of this laboratory. They were: swine 1976 (1931), PR8 (A–1934), PR301 (A′–1954), AA/1 (A′–1957), and AA/23 (Asian–1957).

Saline refers to 0.15 M sodium chloride buffered at pH 7.2 with 0.01 M phosphate.

Results

Secondary antibody response of children to adjuvant or aqueous vaccines after initial vaccination with either product. In order to ascertain the sequence of vaccines that yields optimal antibody responses in children, groups of 25 children were given either adjuvant or aqueous polyvalent influenza virus vaccine in May 1957 and 7½ months later, in December 1957, were injected with the same vaccine or with vaccine of the opposite kind. The adjuvant vaccine contained 60 chicken cell agglutination (CCA) units each of swine (A), PR8 (A), and PR301 (A′) strains per dose. The aqueous vaccine contained, per dose, 200 CCA units of each of the same viruses.

Table 1 shows antibody responses measured by hemagglutination inhibition in serums obtained 2 weeks after revaccination with aqueous

Table 1. Antibody response of children to a second dose of aqueous or adjuvant vaccine after an initial dose of either vaccine

Polyvalent vaccine	Test strain and antibody response [1]		
	Swine	PR8	PR301
Aqueous; [2] aqueous: [3]			
Before second dose	30	29	102
After second dose	179	512	307
Aqueous; [2] adjuvant: [3]			
Before second dose	42	21	83
After second dose	922	2,458	1,226
Adjuvant; [2] aqueous: [3]			
Before second dose	154	205	768
After second dose	410	870	1,331
Adjuvant; [2] adjuvant: [3]			
Before second dose	242	141	768
After second dose	1,229	1,741	1,818
Controls:			
May 1957 [4]	8	8	16
December 1957 [5]	8	8	24

[1] Geometric mean antibody titer. [2] Initial dose. [3] Second dose. [4] Before experiment. [5] After experiment.

vaccine and 6 weeks after revaccination with adjuvant vaccine. Antibody levels found in serums of a control group of nonvaccinated children from whom blood specimens were taken before and at the conclusion of the experiment are included. Note that, as previously reported, in children the response and persistence of antibody following the first inoculation of either aqueous or adjuvant vaccine was markedly higher against the A′ strain than against swine or PR8 virus. The reason for this discrepancy in response to these antigenically representative strains given by vaccination is that these children were born after the period of prevalence of the latter antigenic types of influenza A strains (*12,13*), and had acquired familiarity with A′ antigens by natural infection but were inexperienced or unfamiliar with swine and PR8-like antigens.

However, two doses of polyvalent vaccine of either the aqueous or adjuvant type overcame the limiting effect of their deficiencies in antigenic experience. Two doses of aqueous vaccine induced higher and broader antibody levels against the prototype strains used for vaccination and testing than did a single dose of aqueous vaccine. The antibody response after the second dose of aqueous vaccine was not too different from that found after a single dose of adjuvant vaccine. More importantly, aqueous vaccine followed by adjuvant vaccine, and adjuvant vaccine followed by aqueous vaccine, resulted in higher and broader antibody levels than were induced by two doses of aqueous vaccine. In this age group, the highest and most uniform antibody levels were achieved by two doses of adjuvant vaccine. The nonvaccinated children showed no significant antibody increase to these strains during the period of study, even though an epidemic of Asian influenza occurred among them in October.

These data, taken with other examples, reemphasize the conclusion that influenza virus vaccines emulsified with mineral oil have distinct advantages for immunization of man (*14–19*). To explore the problem further, concomitant experiments of identical design were carried out in adults.

Secondary antibody response of adults to adjuvant or aqueous vaccines after initial vaccination with either preparation. Four groups of 25 adults each, all over the age of 30 years, were vaccinated and revaccinated with the same vaccines and with the same dosages and schedules as were used for children. The antibody responses of these adults, measured by hemagglutination inhibition, are shown in table 2.

Table 2. Antibody response of adults over 30 years of age to a second dose of aqueous or adjuvant vaccine after an initial dose of either vaccine

Polyvalent vaccine	Test strain and antibody response [1]		
	Swine	PR8	PR301
Aqueous; [2] aqueous: [3]			
Before second dose	230	166	24
After second dose	333	333	45
Aqueous; [2] adjuvant: [3]			
Before second dose	192	128	51
After second dose	1, 229	922	358
Adjuvant; [2] aqueous: [3]			
Before second dose	1, 843	1, 331	512
After second dose	2, 867	2, 458	768
Adjuvant; [2] adjuvant: [3]			
Before second dose	1. 843	1, 024	461
After second dose	3, 686	2, 048	1, 024
Controls:			
May 1957 [4]	58	14	10
December 1957 [5]	109	21	13

[1] Geometric mean antibody titer. [2] Initial dose. [3] Second dose. [4] Before experiment. [5] After experiment.

Again, the effect of prior conditioning by natural infections upon antibody response to influenza virus vaccines is seen in this age group. The difference in the response of children and adults is explainable by the fact that these adults had their primary exposure to swinelike viruses in their childhood, and later in their lives were exposed to A and A′ strains (*12–13*).

In consequence, the antibody response to the first dose of either kind of vaccine is greatest to swine strain, next to PR8, and least to the A′ test virus. Unlike the result in children, two doses of aqueous vaccine did not appear to cause an important increase in the height or breadth of antibody response to the prototype strains given. Apparently persons of this age group are refractory to successive stimuli with aqueous influenza virus vaccines of this potency.

In contrast, a single dose of adjuvant vaccine induced higher and broader antibody levels in

adults than did two doses of aqueous vaccine. In addition, the results after alternate vaccination with two kinds of vaccine are somewhat different from the findings in children. Polyvalent adjuvant vaccine, followed by polyvalent aqueous vaccine, yielded higher and more uniform antibody levels against all test strains than did the reverse combination. Apparently adjuvant vaccine overcomes the refractory state shown by the failure of persons over 30 years of age to respond very actively to successive doses of aqueous vaccine alone.

The first dose of aqueous vaccine does not appear to condition the adult cohort sufficiently for them to respond optimally when given the later dose of adjuvant vaccine. Conversely, the first dose of adjuvant vaccine appears to lay a more effective foundation for the second stimulus since even though it was given as an aqueous preparation, further enhancement of all antibody levels was thereby achieved. On the average, as in children, the best result in adults came from two doses of adjuvant vaccine. Antibody increase in the unvaccinated group was minimal and apparently was caused by infection with Asian strains since an outbreak of Asian influenza was identified in this area during the investigation.

The results of the experiments indicate that, in both children and adults, with current products, optimally broad and high antibody levels against the prototype strains of influenza A viruses can best be induced by vaccination with two doses of adjuvant vaccine. Less advantageous, though clearly effective, is a schedule that alternates successively the use of aqueous and adjuvant vaccines. As has been shown, the final antibody yield under these circumstances is considerably influenced by age and its concomitant status of prior antigenic exposure (*3,4*). Least advantageous is a schedule of two doses of aqueous vaccine.

Persistence of antibody after two doses of polyvalent influenza virus vaccine. One of the advantages of adjuvant vaccine is the persistence of antibody at high levels for a long period. To compare the persistence of antibody after vaccination with aqueous or adjuvant vaccines given in the two-dose combinations used, blood specimens were taken from both children and adults 1 year following the second vaccination, and antibody levels were determined. Table 3 shows the geometric mean antibody titers observed after the second vaccination and 1 year later.

In children, antibody titers induced by two doses of polyvalent aqueous vaccine had fallen to low levels by the end of 1 year, as had the levels achieved with polyvalent adjuvant vaccine followed by polyvalent aqueous vaccine. Although the levels produced by two doses of adjuvant vaccine, or by aqueous vaccine followed by adjuvant vaccine, fell in the year's interval, high levels against the vaccine strains were still present.

In adults too, residual antibody levels were

Table 3. Geometric mean antibody titers of three test viruses in children and in adults 6 weeks and 1 year after a second inoculation with aqueous or adjuvant vaccine

Polyvalent vaccine	Time after vaccination	Geometric mean antibody titer					
		Children (4–11 years)			Adults (over 30 years)		
		Swine	PR8	PR301	Swine	PR8	PR301
Aqueous	6 weeks	216	410	563	131	192	77
Aqueous	1 year	18	24	102	83	83	29
Aqueous	6 weeks	563	2, 662	2, 662	1, 024	512	307
Adjuvant	1 year	96	512	1, 126	614	307	205
Adjuvant	6 weeks	256	1, 024	3, 891	2, 613	1, 131	973
Aqueous	1 year	19	32	614	563	205	256
Adjuvant	6 weeks	1, 131	819	1, 046	1, 536	922	1, 843
Adjuvant	1 year	307	166	666	666	291	486

lowest in those persons who received two doses of aqueous vaccine. In contrast, antibody levels found 1 year after the second inoculation of vaccine were high against all strains in serums of the three groups whose schedules included adjuvant vaccine.

The findings demonstrate that in children persistence of high and broad antibody levels for 1 year required the use of adjuvant vaccine for the second dose. In adults, antibody persistence was not dependent, apparently, upon whether the adjuvant vaccine was given first, last, or twice.

Relation of virus content in primary adjuvant vaccine to conditioning for secondary response. Mineral oil adjuvant vaccines have been shown to be useful not only because they provoke high antibody levels that persist, but, in addition, considerably less antigen is required when the antigen is incorporated in a water-in-oil emulsion (*14,19*). To date the studies on conservation of influenza antigens by the use of mineral oil adjuvants have been limited to the results following a single dose of vaccine. It was of interest, therefore, to ascertain the minimal amount of virus that was capable of setting the stage for a satisfactory booster response when the initial dose was given as an adjuvant preparation. For this purpose, four groups of 25 children each, ages 11 to 16 years, were given an adjuvant vaccine containing either 1, 10, 50, or 250 CCA units of swine strain. Five months later, blood specimens were taken from the subjects, and they were revaccinated with an aqueous vaccine containing 200 CCA units each per dose of swine, PR8, and PR301 strains. Final serum samples were obtained 2 weeks later.

The experiments were conducted between December 1956 and April 1957. A small outbreak of influenza A′ occurred in this region during that period. Swine strain was chosen for the first vaccine stimulus, because the children had not been previously exposed to that virus, and their serums were generally devoid of antibodies to it (*12,13*). For the secondary vaccine stimulus, a polyvalent vaccine containing swine strain was employed, because polyvalent vaccines are in general use for protection against influenza.

The results of antibody determinations in serum samples obtained from each group before and after the booster dose of aqueous vaccine are summarized in table 4. For comparison, antibody levels found in a fifth group of 25 children given a single dose of the same aqueous vaccine are shown.

Apparently, no conditioning of the antibody-forming mechanisms had occurred with the first vaccination in the group given 1 CCA unit of swine adjuvant vaccine. When individuals in the group who had received 10 CCA units of swine virus were revaccinated, the antibody response was markedly greater, indicating that an important conditioning had occurred follow-

Table 4. Effect of varying amounts of swine virus in adjuvant vaccine given as a primary stimulus upon antibody response to a "booster" vaccination with aqueous vaccine

Primary vaccination [1] (CCA units swine strain)	Serum examined	Geometric mean antibody titer
1	5 months after first dose [2]	8
	2 weeks after second dose	19
10	5 months after first dose [2]	22
	2 weeks after second dose	154
50	5 months after first dose [2]	102
	2 weeks after second dose	230
250	5 months after first dose [2]	128
	2 weeks after second dose	410
Control: [3]		
Prevaccination serum		8
Postvaccination serum		18

[1] Adjuvant vaccine.
[2] Revaccinated with aqueous vaccine containing 200 CCA units swine, PR8, and PR301 strains per dose.
[3] Single dose aqueous vaccine.

ing that first stimulus. In fact, by increasing the amount of virus used for the primary dose fivefold (50 CCA units) or 25-fold (250 CCA units) the yield of antibody after the booster dose was only 1.5 times and 2.7 times higher, respectively, than was obtained with but 10 CCA units. However, the "prebooster" titer was much higher after the 50 and 250 CCA unit initial dose.

These results suggested that the most economic "cutoff point" for selecting a dose for primary immunization with an adjuvant vaccine might be 10 CCA units, and clearly indicated that relatively small amounts of virus are capable of laying the foundation for a secondary response if given in the emulsified form.

Antibody response following two small doses of polyvalent adjuvant vaccine. The success obtained in minimizing the amount of virus needed for primary stimulation by vaccination, as described in the preceding section, prompted studies designed to determine whether comparably small amounts of virus could be used per strain in a polyvalent vaccine to be given for both primary and "booster" inoculations. At the same time, the question of shortening the interval between injections was investigated.

To these ends, two groups of 25 children each were inoculated with a polyvalent adjuvant vaccine containing 10 CCA units of swine, PR8, A′, and Asian strains (40 CCA unit vaccine). Eight weeks after the primary vaccination blood specimens were taken from the first group and they were revaccinated; 12 weeks after the first injection blood specimens were taken from the second group and they were revaccinated. For comparison, a third group received a more potent vaccine containing 50 CCA units each per dose of swine, PR8, and A′ virus strain and 100 CCA units of Asian virus (250 CCA unit vaccine); blood specimens were taken from them and they were revaccinated with the same preparation 12 weeks later. Final serum specimens were obtained from each group 8 weeks after the second vaccination. These investigations were carried out from December 1958 to February 1959. Influenza was not observed in this area during that interval. Table 5 shows the geometric mean antibody titers found for these groups before and after the second vaccination.

As observed in previous experiments of this series, in children antibody response to the first vaccination was poor as measured against swine and PR8 strains, but good against A′ virus. Moreover, this effect was, for practical purposes, independent of the strength of vaccine given. Note that the response as measured by Asian virus was excellent, indicating that these subjects has been already conditioned by infection as early as the summer of 1958, when the experiments were conducted, to respond well to a single vaccination with preparations of either potency.

A second inoculation of the small dose of adjuvant vaccine 8 weeks after the first dose resulted in reinforcement of antibody to all antigens present in the vaccine. When the interval between inoculations was increased to 12 weeks, a greater reinforcement of antibody occurred against swine, PR8, and Asian strains.

Table 5. Antibody response in children after two doses of adjuvant vaccine containing very small amounts of virus

Primary vaccination (CCA units adjuvant vaccine)	Revaccination	Geometric mean antibody titer			
		Swine	PR8	A′	Asian
40 (small dose)[1]	8 weeks after first dose	19	19	166	256
	8 weeks after second dose	102	96	512	717
40 (small dose)[1]	12 weeks after first dose	22	22	179	358
	8 weeks after second dose	230	230	512	922
250 (standard dose)[2]	12 weeks after first dose	24	18	166	512
	8 weeks after second dose	256	90	461	1, 229

[1] 10 units each swine, PR8, A′, and Asian strains.
[2] 50 units each swine, PR8, A′; 100 units Asian strain.

The 250 CCA unit vaccine given twice at a 12-week interval gave antibody levels not significantly different from those obtained after two doses of 40 CCA unit vaccine given 3 months apart.

These results would appear to establish the principle that an enormous saving in antigens can be effected when very small amounts of influenza viruses are incorporated in emulsions made with mineral oil and used at appropriate intervals for primary and booster inoculations. Application of this method to other virus-antibody systems would seem appropriate.

Discussion

The results of the present study appear to be especially pertinent to the problem of protection against influenza by vaccination, and, in addition, may have general implications for the use of killed-virus vaccines.

As demonstrated in the present study, satisfactory high, broad, and durable antibody levels against influenza A viruses cannot be obtained currently, except by the use of adjuvant vaccine employed as part of a two-dose schedule of inoculations. The adjuvant vaccine may be used for both doses, or for the second dose. The high antibody levels obtained should provide a larger margin of security for protection, since they appear to be well above the minimal level needed for resistance to infection (*20*). The breadth of antibody response induced is deemed advisable because such a composite antibody appears to provide a firmer basis for resistance, which is not as readily overcome by antigenic variation in strains that may prevail after a vaccine has been given.

The persistence of antibody at high levels after vaccination bears promise of eliminating the necessity for annual revaccination against influenza. The exact period of time that may elapse before a third dose of adjuvant vaccine is required is, as yet, undetermined, but in this connection it is pertinent to point out that persistence for 3 years of high levels of antibody following a single dose of adjuvant vaccine has been observed by Davis and associates (*21*). Elimination of the necessity for annual revaccination should promote acceptance of influenza virus vaccines by physicians and the general public.

The demonstration that two small doses of virus in adjuvant can induce high antibody levels in a short time even to strains of influenza viruses with which the subjects had had no prior antigenic experience, is an important finding. There are several practical implications of this observation.

Obviously, it would have been an advantage in the summer of 1957 to have been able to immunize persons effectively against Asian influenza, using only a total of 20 CCA units of an Asian strain given in divided doses 8 weeks apart. Since the minimum potency of aqueous vaccine used in that emergency contained 200 CCA units of Asian virus, the procedure outlined would have effected a tenfold saving in antigen and at the same time probably would have yielded higher titers of antibody than those resulting from vaccination with the aqueous product. Stated another way, the limited stocks of Asian antigen available that summer could have been utilized to offer protection to 10 times as many persons, with greater confidence in the degree of protection obtained. Consequently, the time needed for effective mobilization against the pandemic could have been shortened. In the face of the next pandemic of influenza, such a practice may prove helpful.

The use of two small doses of virus in adjuvant may also prove to be advantageous for vaccines that contain antigens which are costly to produce or which at best can only be grown at low titer. Conservation of antigen using types 4 and 7 of adenoviruses in an adjuvant vaccine has already been shown by Meiklejohn (*22*). Excellent protection against acute respiratory disease was demonstrated in recruits using but one-half the amount of adenovirus licensed for incorporation in an aqueous product. Moreover, the same vaccine contained 50 CCA units each of six strains of influenza viruses, and was equally effective in protecting against Asian influenza (*22*).

Clearly, the way seems open for the further development of multivirus vaccines containing in the same package different disease agents. At the speed with which new viruses are currently being isolated and identified (*23*), it is obviously desirable to have available a procedure for inducing protective antibodies

against the largest number of viruses at the lowest cost for antigen and with the least number of injections. In addition, it is desirable to have such antibodies persist for prolonged periods of time. At present, the most promising approach toward these goals is the use of small doses of virus in adjuvant given for primary and booster stimulation.

Summary

The findings of this study demonstrate that broad and high levels of antibody against all known families of influenza A virus may be induced in children and adults by either two doses of adjuvant polyvalent vaccine or by aqueous polyvalent vaccine followed by adjuvant polyvalent vaccine. Antibodies so produced remain at high levels for a long period of time while antibodies produced by two doses of aqueous vaccine fall to low levels in one year.

In children it was observed that two very small doses of virus in adjuvant vaccine gave high levels of antibody even when the interval between inoculations was only 8 weeks.

The findings reported indicate that high, broad, and persistent antibody levels can be achieved in man with a minimum of inoculations and materials. The implications of the results are discussed.

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Sustained Glaucoma Screening Program

LEON J. TAUBENHAUS, M.D., M.P.H., and JOHN G. McCORMICK, M.S.P.H.

GLAUCOMA, the second ranking cause of blindness in the United States, is responsible for one out of every eight cases of blindness. It occurs in about 2 percent of all people over 40 years of age and is more frequent with increased age.

Within the past decade the public health significance of the early detection of glaucoma has been recognized. Screening programs among the general population have been reported from many communities (*1–9*), but most of these programs were of a "one-shot" nature. The Brookline, Mass., program, however, is a regularly scheduled activity.

The Brookline glaucoma screening program was born in April 1957 at a meeting of the Sub-Council on Health of the Brookline Community Council. At this meeting representatives of the Lions Club said they were looking for ways in which they could help develop an effective community sightsaving program. The Brookline Health Department suggested to the Lions Club that a jointly operated glaucoma screening program might be the answer. After several meetings and exploration of what others had done, such a program was agreed upon.

There were three major reasons why glaucoma screening was selected. First, the town of Brookline has an unusually high proportion of older people. Approximately 29,000 residents, or 52 percent, are age 40 or older, and more than 7,500, or 14 percent, are 65 years or older. Actually, there are more people over age 65 in Brookline than there are children in its public schools. Second, the health department was concerned that it was expending most of its energies on programs for children despite the fact that the aged represented a larger proportion of the population. A third factor which influenced the selection of a glaucoma screening program was the existence of a new health center which was centrally located and well equipped to carry out a variety of public health programs.

The joint sponsors met frequently to work out the details. It was agreed that the Lions Club and health department would share the costs. The Lions Club would pay for additional professional personnel, new equipment, and expensive promotional costs, and also provide nonmedical volunteers. The health department would handle routine expenses such as educational materials, records, medical supplies, and publicity, plus administrative, nursing, and custodial services. It would take full responsibility for followup.

The decision to sponsor a sustained program, featuring smaller regularly scheduled clinics rather than one massive clinic, was made at this time. All concerned felt that the mechanics of followup of suspicious cases would be much more effective in the sustained program. In a clinic of 100 patients, 3 to 5 referrals for possible glaucoma could be anticipated, while in a clinic screening 2,000 individuals, 60 to 100 patients would require referral. The effectiveness of followup of the smaller caseload is obvious. The sponsors believed that at the end of a year the total number of patients screened would equal that of a massive "crash" program.

A formal letter was sent to the local medical

Dr. Taubenhaus is director of public health, Brookline, Mass., and lecturer on public health practice, Harvard School of Public Health. Mr. McCormick is coordinator, aging research project (formerly health educator), Brookline Health Department, and instructor in health education, Harvard School of Public Health.

society asking approval of the program and appointment of a representative to serve on a technical advisory committee. The society endorsed the program and expressed its appreciation for having been consulted early in the planning stages.

A technical advisory committee was established, consisting of the chiefs, or their delegates, of the eye services of the three teaching hospitals in the Boston area. Also on the committee were representatives of the Massachusetts Division of the Blind and the Massachusetts Department of Public Health. The Lions Club was represented by an ophthalmologist and an optometrist, as well as by the lay officers of the club. The health department was represented by its director and its health educator.

Procedures and Standards

The functions of this committee were to set the technical procedures and to determine the ethical standards for the operation of the clinic. A number of difficult questions had to be answered. The most difficult, by far, was that of defining the proper relationship between the ophthalmologists and the optometrists working in the clinic. Fortunately, the chairman of the technical advisory committee had worked with optometrists in a veterans hospital. Likewise, the optometrist on the committee had previously worked with many local ophthalmologists. The committee decided, after much discussion, to allow optometrists to work at those clinical procedures, such as visual acuity and the Harrington-Flocks screener, which did not involve putting drops in the patients' eyes. Since many people over 40 consult only an optometrist, the committee felt that clinic utilization might be increased if optometrists were included.

Clinic hours were set from 4:30 to 8:30 p.m. to attract people who could not come during working hours. A maximum of 100 patients were to be seen by appointment at each clinic. Eight appointments were given for every 20-minute period. A keysort punchcard was designed for the clinic record to facilitate follow-up and evaluation. The technical advisory committee also specified the types of eye drops to be used, the method of doing the tonometry, the procedure for sterilizing instruments, and the technical information about glaucoma and the clinic that would be given to the patients after their examination.

The standards for referral set by the committee were an intraocular pressure of 25 mm. Hg or above, or a differential tension of 6 mm. Lens changes also were routinely referred. All other eye conditions were referred at the discretion of the examining physician.

Promotional Methods

The methods of interpreting and promoting the clinic in the community were shared by both sponsoring agencies. The health educator was responsible for coordinating all the educational efforts. Since Brookline is highly organized, it was decided to lean heavily on already existing community organizations. The promotion and interpretation of the program through professional workers and community leaders was chosen as the first step. Inservice training programs on glaucoma and its prevention were developed and presented to teachers, social workers, pharmacists, nurses, physicians, and recreation workers. These are the people who have the greatest contact with adult and older age groups. A special effort was made to insure that these people—the so-called "gatekeepers"—all had their eyes tested early so that they could say, "I have had this test and I can honestly recommend it to you. It doesn't hurt!"

During the 8 weeks preceding its opening, feature articles on the clinic appeared in the local and metropolitan press. The Governor as well as the local board of selectmen appeared in several photo stories describing the program.

The Community Council of Brookline, where the idea for a clinic originated, endorsed the program and sent a letter to each of its 78 member agencies asking for their cooperation. The council also suggested that each agency might wish to plan a future educational program around glaucoma in order to interpret this new service to its members.

Shortly before the opening of the first clinic, a special issue of the *Health Bulletin* was devoted to glaucoma. This bulletin is distributed by the health department 4 times a year to

each of the 18,000 households in Brookline. This issue contained a simple illustrated feature describing what glaucoma was and the specific tests which were being offered to detect it. A speakers' bureau made up of Lions Club members and health department staff was available to community groups. Along with a talk on glaucoma, the film "Hold Back The Night" was used. This Canadian-produced film proved to be far superior to anything else available to us. Exhibits were posted in various store windows. The public library developed and exhibited a very attractive display on glaucoma.

The priority on promotional efforts follows.

Block appointments were offered to captive groups, such as policemen, firemen, teachers, and members of golden age clubs, service clubs, PTA's, and religious organizations. The secretary of each group was asked to fill a block of appointments. The response was so great that 1 month before the clinic opened, several hundred appointments had been made.

The second wave of appointments was built upon this initial momentum. Newspaper notices and the special issue of the *Health Bulletin* contained appointment coupons which residents could fill out and mail to the health department. By the time of the first clinic, there was a backlog of 1,000 appointments. This response encouraged other organizations and individuals to jump on the bandwagon. Another technique employed at this time was to enclose postage-paid appointment cards with welfare checks. The social workers, having been previously briefed, were able to answer questions and encourage their clients to participate.

The third wave of appointments came through person-to-person contacts. As he left the clinic each patient was handed one or more postage-paid appointment cards and was asked to tell his friends and neighbors about this clinic. Volunteers from the various golden age clubs personally solicited members and nonmembers alike to sign them up. Lions Club members and their wives also helped with this personal solicitation campaign.

Clinic Procedures

A patient entering the clinic comes directly into a large waiting room. Here the wives of the Lions Club members register him and take his personal and ophthalmic history. Behind the registration tables is an exhibit containing an automatic slide projector which allows the patient to see in advance what tests he is going to have as he goes through the clinic.

The patient is first tested for distant vision using a Snellen chart at 20 feet. This is done by an optometrist or a public health nurse. If the vision is below 20/40 he is retested with glasses or a pinhole. A volunteer collects the clinic cards and keeps them in proper sequence, calling each patient by name when it is time for his next test. At each step in the clinic procedure an effort is made to treat the patient as an individual rather than as a number.

During the first 2 years, a Harrington-Flocks screener was used to check visual fields. After evaluation of our first year's experience with this instrument, the test was dropped because it gave too many false negative results. Three out of four patients, whether or not they had any eye disease, read all the Harrington-Flocks cards correctly (*10*).

At the next step, the eye is inspected and examined with an ophthalmoscope. This is done by ophthalmology residents from two Boston teaching hospitals. Finally, a resident measures the intraocular pressure using the 1955 Schiotz tonometer. All clinical procedures are supervised by a practicing ophthalmologist who is also a member of the Lions Club.

After tonometry, a public health nurse interviews the patient. She reassures him if no abnormality was found and recommends retesting every 2 years. If ocular pathology was found, she initiates the referral procedure. When a patient is referred, a letter of explanation is sent immediately to the family physician and the eye doctor or clinic designated by the patient.

After seeing the nurse, the patient goes back to the waiting room where he is asked by a volunteer to fill out a postclinic reaction sheet. An analysis of the answers to this questionnaire reveals patient attitudes toward the clinic procedures and indicates how the service may be improved. It also supplies information on how citizens hear about this clinic (*11*).

In order to evaluate the program and main-

Results of 43 clinics in Brookline glaucoma screening program through December 1, 1960

Patients examined	3,127
Total normal	2,446
Total referred	681
Referrals for possible glaucoma	199
Diagnosis of glaucoma confirmed	58
Previously known	17
Previously unknown	41
Diagnosis of glaucoma unconfirmed [1]	60
Diagnosis of glaucoma pending	81
Referrals for other eye conditions	482
Diagnosis of other eye conditions confirmed	226
Diagnosis of other eye conditions unconfirmed	19
Diagnosis of other eye conditions pending	237

[1] Certain patients require continued observation since they may have borderline cases that will develop into glaucoma.

tain adequate control, a special clinical record was developed. It consisted of an easy-to-tabulate keysort punchcard. Following every clinic the senior author reviews and punches each record. He checks to be certain that full and correct information about each patient, including the results of his tests, has been properly recorded. These cards are also used for followup as well as for clinical information. Separate punches are made when a patient is referred to a physician or a clinic, when follow-up letters are sent, and when reports come back. It is possible to determine quickly at any time the current progress of each patient being followed.

In the 43 clinics held through December 1, 1960, 3,127 patients had been examined. This is approximately 11 percent of the eligible population. The proportion of residents examined increases with their age. Since the amount of ocular disease found is directly related to age, the program has been successful in reaching the groups with the greatest potential of eye disease. One interesting side effect of the clinic has been reported by local ophthalmologists who say that many of their patients who come to them for refractions now demand tonometry and refer to the new program available at the health center. Some of these physicians were frank to state that although tonometry was not previously a routine practice in their office, it is now.

Of the 3,127 patients screened, 199, or 6 percent were referred because of abnormal tensions (see table). Glaucoma was confirmed in 58 cases (2 percent). If these findings are projected to the 81 cases for whom a definite diagnosis is still pending, a total of approximately 98 cases could be anticipated from this program. Of the other types of eye disease for which patients were referred, refractive errors were the most common (20 percent), lens changes next (12 percent), followed by abnormalities noted on inspection (6 percent), and abnormal disks (9 percent).

The expense of operating the clinic has been low. The cost of each examination is approximately $1. The cost of each case of glaucoma discovered varies between $50 and $60. When this is compared with the estimated cost to the State of $1,500 a year for the maintenance of each blind person, the economic impact of such a program can readily be appreciated. In addition to glaucoma, other eye diseases which may lead to blindness are also being discovered and referred for correction.

Conclusion

Glaucoma causes one out of every eight cases of blindness and occurs in 2 percent of the population above the age of 40. It is insidious, progressive, and can lead to marked reduction in vision or even total blindness before its discovery.

Glaucoma detection with followup to treatment makes an ideal public health program. It is easily performed; it is inexpensive; and appropriate treatment halts further disability. The Brookline experience demonstrates the feasibility of conducting a sustained program for the detection of glaucoma and other eye diseases. It also demonstrates how an official agency (health department) and a voluntary organization (Lions Club) can combine their efforts to solve more effectively a community health program than can either organization working alone.

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Guidelines for Mental Health Service Facilities

Surgeon General Luther E. Terry in letters to all State Governors has urged consideration of guidelines for improved planning of mental health facilities which are set forth in a publication entitled "Planning of Facilities for Mental Health Service."

Prior to general distribution, each Governor was sent the 55-page report of findings of the Surgeon General's ad hoc committee which was assigned to develop a basis for planning mental health facilities.

The committee, comprised of State Hill-Burton hospital construction authorities, and State mental health authorities, began its study of the Nation's mental health facility needs in September 1959.

The Surgeon General said that the formation of the 12-member committee was an outgrowth of "the concern that more effective methods be found to assure adequate treatment and care of the mentally ill."

The report recommends in part that:

"Community-based mental health facilities be established as part of a coordinated system of statewide health services. The ultimate objective would be to provide proper facilities for early diagnosis, intensive and continued treatment, and rehabilitation programs designed to restore the individual to his fullest mental, physical, social, and vocational abilities.

"Each Governor consider taking whatever steps are necessary to stimulate the development of a comprehensive plan for mental health facilities.

"States enact enabling legislation and provide additional financial support to stimulate the construction, equipment, and maintenance of needed mental health facilities approved by the planning body."

The committee further recommended that "construction and expansion of large mental institutions be strongly discouraged, and State activities be directed toward replacement of existing institutions of this type by smaller community or regional facilities offering a wide spectrum of services."

The publication (PHS Publication No. 808) is on sale by the Superintendent of Documents, Government Printing Office, Washington 25, D.C., at 40 cents a copy.

Program Notes

Coordination of Puerto Rico's Health and Welfare Services

Conrad Seipp, Ph.D.

PUERTO RICO'S experimental project to regionalize health and welfare services is dedicated to achieving a coordinated system for the distribution and delivery of comprehensive health care. This is the integration of preventive, diagnostic, curative, and rehabilitative medicine reinforced by and reinforcing the provision of social service.

In 1954, prior to the initiation of this project, the Secretary of Health of the Commonwealth of Puerto Rico appointed a study group to make a survey of all health and welfare resources available in the 16 municipalities served by the Bayamón District Hospital and to make recommendations for improving their use. This study group gave consideration to the economic, social, and governmental resources of Puerto Rico as a whole, and formulated recommendations for the organization and administration of all publicly financed health and welfare services in these municipalities. Steps were then taken to test these recommendations in the Bayamón region.

In 1956 a regional office for coordination and research was organized within the Department of Health of Puerto Rico to implement the recommended integration of services and to experiment with their organization and administration on a regional basis in the Bayamón area. Regionalization was visualized as a blend of the following components:

1. Creation of a coordinated system of health care facilities in which the peripheral health centers would be organically related to the operation of a district hospital, and the district hospital, in turn, would function as a base hospital facility. In Puerto Rico a health center brings together in a single facility at the municipal level a public health unit, a public welfare unit, and a hospital unit (based on the standard of approximately 1 bed per 1,000 population). The organizational scheme that was proposed therefore implied an intimate two-way flow between the peripheral health centers and the referral hospitals not only of patients but of services, supplies, and technical personnel.

2. Implementation of a system of continuing education of all health and social workers, encompassing all levels of inservice training and formal postgraduate study.

3. Raising the technical consciousness of the consumer public. This included broad health education aims and incorporated the recognition that the provision of service, however adequate in a technical sense, could function at maximum effectiveness only if the recipients were instructed on how to make the best use of available services.

4. Finally, this development was predicated upon the belief that health does not constitute an end in itself, but it also represents a means toward the development of more viable communities. Because it was recognized that advances in health and welfare cannot proceed independently of the development of the other aspects of community life, a major concern set for this project was an attempt to provide technical services in such a way that they would be more effectively related to the provision of other services such as housing, education, and agricultural development at the community level. In this way it was hoped that health and welfare work would contribute more effectively to

Dr. Seipp is director, planning, evaluation, and research, Commonwealth of Puerto Rico Department of Health, San Juan.

the broader objective of strengthening community life.

Four distinct phases in the regionalization project can be identified. The initial planning stage entailed the study necessary to devise the methods and procedures which the integration of services implied. The second experimental stage was the preparation of tentative standards for the organization and management of each service operating at the community level and the testing of these standards in one selected demonstration health center. Late in 1958 responsibility for the administration of all health and welfare services in the Bayamón area was delegated to the regional office.

At the start of the current stage of the project, administrative responsibility for the base regional hospital of the coordinated system of health care facilities was transferred to the School of Medicine of the University of Puerto Rico. This hospital is now the primary teaching institution of the school. Subsequently, responsibility for the entire health and welfare service budget of the Bayamón region, containing a population of more than 800,000 persons, was transferred to the school of medicine.

A new position of assistant dean for community health was created, and the staff and resources have been completely integrated, providing a single unified direction in the three areas of training, research, and service. The faculty of the clinical departments of the school of medicine are currently extending their technical and professional supervision to the periphery of the area. The Bayamón region can be viewed as a working laboratory for clinical and operational research and demonstration.

Evidence is accumulating concerning the impact of this organizational scheme on the quality of care and the improvement of general health levels. Accepting stringent budgetary limitations and other handicaps, this project is demonstrating the extent to which the return on the health-care dollar can be increased. At the same time, much remains to be accomplished to attain the evolving objectives of the regionalization of health care in Puerto Rico.

Child Health Center To Be Established

Secretary of Health, Education, and Welfare Abraham Ribicoff has issued the following statement concerning the President's directive that a Child Health Center be established within the Public Health Service:

"The Public Health Service now has a number of research programs dealing directly or indirectly with child health. We shall concentrate the efforts of these to fuller advantage from funds available. The new program will be further strengthened through close coordination with the programs of the Children's Bureau, an agency serving mothers and children.

"The new center is being set up in the Division of General Medical Sciences at the National Institutes of Health. This action can be taken administratively without legislation or appropriation.

"Establishment of the new center will bring together the various elements concerned with children's health of several different agencies, and will direct those efforts specifically toward the problems of child health.

"There are statistics to demonstrate the problems facing us in this field. One of these was cited by the President in announcing establishment of the new center when he said that each year some 400,000 babies are born with congenital malformation.

"Here are other statistics considered in the decision to establish the new Child Health Center: Since 1950 the United States has slipped from 6th to 10th place in the rate of infant deaths. The Public Health Service estimates that 3 of every 100 children born are mentally retarded. This is 126,000 mentally retarded children born each year.

"This new program in the field of child health shall have the fullest possible backing and encouragement."

TYPHOID FEVER EPIDEMIC FOLLOWING A WEDDING RECEPTION

Charles T. Caraway, D.V.M., M.P.H.
John M. Bruce, M.D., M.P.H.

EPIDEMICS of typhoid fever resulting from a common source are becoming increasingly rare. The majority of outbreaks observed during the past decade have been due to contact transmission among low socioeconomic groups who have inadequate sanitary facilities and who practice poor personal hygiene habits. An epidemic of 31 cases in southern Louisiana in May 1960, however, demonstrates that common-source outbreaks involving large numbers of people may still occur when carriers of typhoid fever are allowed to assist in the preparation of food for consumption by the public. It also emphasizes the need for finding carriers and placing them under health department surveillance.

By the time the Louisiana State Board of Health was notified of the epidemic, 20 patients were receiving treatment from private physicians. The causative agent had not been isolated. The diagnoses had been based on clinical and serologic findings. A preliminary investigation revealed that some of the patients had attended a wedding reception at a meeting hall on April 23, 1960, and that others had eaten some of the leftover food brought to them after the reception.

Since food appeared to be the vehicle of transmission, a list of persons who attended the reception, as well as those who did not attend but ate the same food, was obtained. These persons were interviewed for epidemiological data. Private physicians and hospital records supplied clinical and laboratory data on the patients, and the patients reported symptoms and dates of onset.

Refreshments served at the reception consisted of home-prepared chicken salad sandwiches, cake from a commercial bakery, and punch made from a mixture of commercial beverages. The sandwiches were suspected early in the investigation because some of the patients who did not attend the reception ate sandwiches but no cake or punch.

Two women boiled and boned the chicken and cooked the eggs on the afternoon of April 22. The eggs and meat were refrigerated until approximately 7 a.m. the following day. At this time the eggs were peeled, the meat was ground, and mayonnaise, celery, salt, and pepper were added. All the ingredients were mixed by one of the women who had prepared the chicken and eggs the previous day. Four additional women assisted in spreading the sandwiches. About 9 a.m. the sandwiches were taken to the hall where they were served about 11 a.m.

In an effort to isolate the causative agent and to confirm the diagnosis in as many patients as possible, feces, urine, and blood specimens were requested from each patient. Because of the possibility of mild, unrecognized, or subclinical cases, each person who was at the reception or had eaten some of the food was asked to submit two specimens of feces to the State board of health for bacteriological examination. Also, each of the six women who participated in preparing the sandwiches submitted at least three samples of feces and three of urine, which were collected on separate days.

Results

A total of 31 persons became ill with typhoid fever: 25 of the 79 who attended the reception

The authors are with the section of epidemiology in the Louisiana State Board of Health. Dr. Caraway is veterinarian epidemiologist and Dr. Bruce is chief. *They were assisted in this study by Dr. M. F. Houston, health unit director, Marjorie Boudreaux and Laura Bell Porche, public health nurses, and Dr. George H. Hauser and staff of the division of laboratories, all with the State board of health.*

and 6 of the 19 who did not attend but ate some of the same food. Seventy of the persons who attended the reception or ate some of the food, including 24 patients, lived in the community where the reception was held. The remainder lived in three neighboring parishes.

One attack of typhoid fever, not tabulated in this report, began 17 days after the reception in an 8-year-old boy who lived in the community where the reception was held. He did not attend the reception and he denied having eaten any of the food served there or having visited the hall prior to or after the reception. However, his father keeps the key to the hall. *Salmonella typhosa* was isolated from a specimen of his feces which was subsequently found to be the same Vi bacteriophage type as that found in the specimens, which had been confirmed by positive cultures, of the other patients. Although this case could not be definitely tied in with the outbreak, the investigators believe that the boy probably ate one of the sandwiches.

Attack rates were calculated for the refreshment items served (table 1). The analysis shows that 31, 35.2 percent, of 88 persons who ate sandwiches became ill, and the 10 persons who did not eat them did not become ill. All of the 31 patients had eaten sandwiches. Only 27 had cake, and 24 had punch. There was no marked difference in attack rates for those patients who had eaten cake and punch as compared with those who did not. Further analysis showed that three patients who did not attend the reception had eaten only sandwiches.

As shown in the figure, incubation periods ranged from 7 to 34 days, with a mean of 21 days. Sixteen patients were hospitalized for an average of 7.1 days per person. The frequency of symptoms reported by the 31 patients is shown below:

Table 1. Typhoid fever attack rates per 100, by type of food consumed by 98 persons during or after wedding reception

Food	Ingested			Did not ingest		
	Total	Number ill	Rate	Total	Number ill	Rate
Chicken salad sandwiches	88	31	35.2	10	0	0.0
Cake	80	27	33.7	18	4	22.2
Punch	73	24	32.9	25	7	25.9

Table 2. Typhoid fever attack rates per 100 among persons who ate chicken salad sandwiches during or after wedding reception, by age group

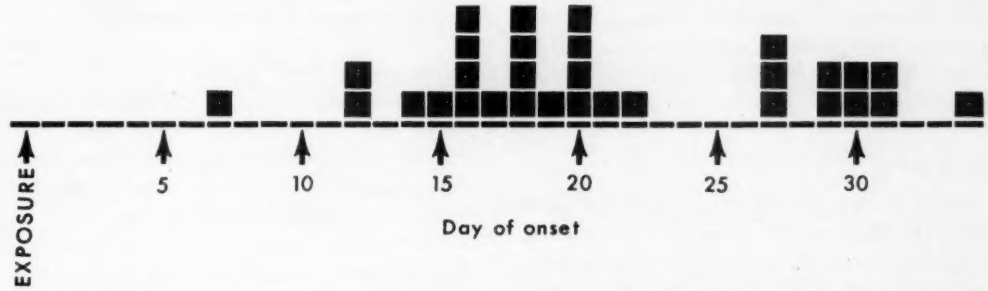
Age group	Total number	Number ill	Attack rate
0–5	6	3	50.0
6–15	10	5	50.0
16–25	16	6	37.5
26–45	28	11	39.3
46–65	23	6	26.1
Over 65	5	0	0.0
Total	88	31	35.2

Symptoms	*Number of patients*	*Percent of patients*
Fever	30	97
Chills	27	89
Headache	26	84
Sweats	23	74
Weakness	21	68
Nausea	18	58
Sore throat	15	48
Stiff neck	13	42
Vomiting	11	36
Constipation	10	32
Diarrhea	9	29
Rash (rose spots)	6	19

The patients ranged in age from 22 months to 64 years. The highest attack rates occurred in those aged 15 years and younger (table 2). Of the 88 persons who ate the sandwiches, 37 were men, 12 (32.4 percent) of whom were affected, and 51 were women, 19 (37.3 percent) of whom became ill.

Typhoid vaccination histories, given by persons who ate sandwiches and verified by health unit records when applicable, were classified according to three broad categories, and attack rates were calculated for each group (table 3). The first category, which included all persons who had received a primary series at any time, was subdivided into three groups according to the date when the last inoculation, either primary series or booster, was received. Comparison of the attack rates for these persons, although the numbers are small, with the rate

Thirty-one cases of typhoid fever, by number of days from exposure to onset



for those who had never been vaccinated, indicates that no protection was afforded those persons who had a primary series of typhoid vaccination. Of seven persons who had been vaccinated within the previous 2 years, three developed typhoid fever. Each of these three had had a booster inoculation in 1959; one had the primary series in 1953, one in 1957 plus a booster in 1958, and the other had his primary series in 1958.

The first laboratory-confirmed case was in a patient from a neighboring parish. *S. typhosa*, Vi bacteriophage type E1, was cultured from his feces and blood. Subsequently, 11 additional cases of typhoid fever were confirmed by positive cultures; 8 from feces, 1 from feces and blood, and 2 from urine. All cultures were Vi bacteriophage type E1. One additional patient whose blood specimen was believed to have been switched with that of his wife might also be counted. Although her blood specimen was proved positive and his negative, the husband had manifested typical symptoms of typhoid fever and the wife had none. When blood specimens were taken and cultured the second time, each was negative, the wife's showing no typhoid agglutinins and his showing an H antigen agglutination titer of 1:160 and an O antigen agglutination titer of 1:40.

Table 3. Typhoid fever attack rates per 100, by vaccination history, among persons who ate chicken salad sandwiches during or after wedding reception

Vaccination history	Total	Number ill	Attack rate
Primary series at any time	37	17	45.9
No booster or series in past 5 years	24	12	50.0
Last booster or series 3 to 5 years ago	6	2	33.3
Last booster or series less than 3 years ago	7	3	42.3
Never vaccinated	46	13	28.3
Unknown	3	1	33.3

Typhoid fever had not been considered by some of the private physicians when diagnosing the illness until they were notified of their patients' exposure and that the diagnoses had been confirmed in other patients. Two patients originally misdiagnosed were subsequently confirmed as having typhoid fever by positive findings in specimens of their feces. One of these patients had denied having any symptoms when she had been interviewed previously. When told of her confirmed diagnosis, she admitted having had mild symptoms and seeing her physician. She had submitted two specimens at the time when all the persons who had attended or had consumed some of the food from the reception were requested to.

Feces and urine specimens from four of the six women who prepared the sandwiches were negative. One woman became ill on May 10, 17 days after the wedding. On May 30 she submitted a specimen of feces which yielded *S. typhosa*. The other woman, who was one of the two who had boiled and boned the chicken on April 22, submitted specimens of feces on May 26, June 7, and July 30, all of which yielded positive findings. A urine specimen collected on June 7 was also positive; however, this specimen may have been contaminated with feces by the patient at the time of collection. This 68-year-old woman denied any recent symptoms. Approximately 30 years ago

her son and a sister had typhoid fever, but she gave no history of ever having the disease. Her most recent illness was influenza in 1958. She is believed to be a chronic carrier and the source of the infection which caused the epidemic.

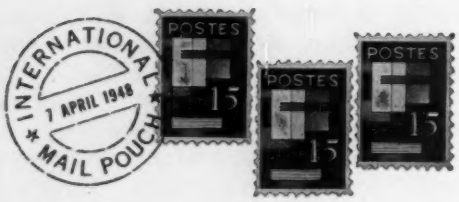
Discussion

This epidemic provided an opportunity to study the effectiveness of typhoid vaccine by comparing attack rates in vaccinated and nonvaccinated groups of persons whose exposure was believed to be reasonably equal. Although the result failed to support any concept that the vaccine affords protection against typhoid fever, it should not of itself discourage the use of the vaccine. It should, however, prompt other investigators into pursuing the question of the effectiveness of typhoid vaccine, which has long been a matter of discussion.

Summary

In southern Louisiana, 31 cases of typhoid fever developed among 88 persons who ate chicken salad sandwiches which were prepared for a wedding reception. One of the women who prepared the sandwiches was discovered to be a typhoid fever carrier. The same Vi bacteriophage type of *Salmonella typhosa* was isolated from the carrier and all of the patients yielding positive cultures.

Comparison of attack rates for those who had been vaccinated and for those who had not indicated that no protection was afforded by the typhoid vaccine.



The Windmill of Jogjakarta

The first exploratory well in the area and the first windmill in Indonesia is giving 5,000 people in Jogjakarta, Java, a dependable water supply. With a mild breeze from the Indian Ocean, the windmill will bring more than 10 gallons per minute from a depth of 300 feet. The completion of the well in December 1959 cut by 3 miles the distance some people had to carry water and has generated further development of the area.

Indonesia's Bureau of Land Utilization started a well-drilling program to assist the farmers in this drought-stricken area. Sites for exploratory drilling were recommended after a geo-electric survey by the geology service of the Department of Public Works of Indonesia and the geology branch, Industry Division, U.S. Operations Mission.

The first exploratory boring struck water in large quantities. Although funds were available only for exploratory work, public interest was so great that the Sultan of Jogja, the Provincial Department of Public Works, and provincial and local officials joined forces to provide the materials and supplies to complete the well. The Bureau of Land Utilization produced a windmill from commodities supplied by the International Cooperation Administration and supervised its erection.

At first only water caught in carrying cans was saved, but as the long dry season approached, the villagers mobilized their scanty resources and successfully appealed to local authorities for help in building a storage tank.

—ICA Health Summary, July–September 1960

Water for Arequipa

Arequipa, Peru's second largest city, last February opened a new water and sewerage system financed in part by a $3.9 million loan, the first extended by the Inter-American Development Bank. The project was conceived and designed by Peruvian engineers assisted by the Pan American Sanitary Bureau.

In addition to providing the water and sewerage connections lacking for 37 percent of Arequipa's 123,000 population, the project is also expected to boost industrial and commercial development in southern Peru.

The new facilities will be constructed over the next 15 years, and the waterworks are designed for future expansion. Consumers' payments will make the water system self-supporting.

Public Health Services *at the* 1960 Winter Olympics

RICHARD F. WHITE, M.D., MALCOLM H. MERRILL, M.D., and WILLIAM W. STILES, M.D.

STAGING of the VIII Olympic Winter Games in Squaw Valley, Calif., February 18 through 28, 1960, presented an unusual opportunity for a local health department to adapt its program to a mammoth public event. The contests in skiing and skating drew tens of thousands of persons each day to this previously sparsely inhabited valley. Long and careful preparation was necessary to insure success of the events and to prevent untoward public health emergencies.

Squaw Valley was chosen as the site in June 1955. At that time the valley had only one ski lodge, one ski lift, and a few scattered homes. By February 1960 there had been erected a giant ice skating arena with a seating capacity of 11,000, an oval speed rink 400 meters in length, three practice ice rinks, three chair lifts, several courses for downhill and slalom skiing, four three-story dormitories large enough to house 1,200 athletes and team officials, an athletes' recreation center, two large centers for spectators, and supporting community plant buildings. The existing ski lodge accommodated officials during the games, and most of the housing for spectators was in the Lake Tahoe and Reno areas, within a 10- to 40-mile radius of Squaw Valley.

Dr. White is director of the Placer County Health Department, Auburn, Calif. Dr. Merrill is director of public health for the State of California. Dr. Stiles, professor of public health, University of California School of Public Health, was medical director of the 1960 Olympic Winter Games Organizing Committee.

Squaw Valley is in the Sierra Nevada Mountains of California at an elevation of 6,200 feet. The site was picked because of the superb skiing conditions and the certainty that there would be enough snow for the contests. Financing of the games was underwritten largely by State and Federal Governments, and the facilities have since been turned over to the State of California for a recreational park. Funds were also provided through individual donations and from the sale of tickets. Much of the staff responsible for putting on the games were volunteers from various organizations and industries throughout the United States.

Athletes and team officials began to arrive on February 1, and the number increased until there were more than 1,000 when the events were opened on February 18. After that date the number remained essentially constant. In addition to the athletes and team officials, there were nearly 4,000 resident administrative and ancillary personnel and spectators numbering from 10,000 on a weekday to 47,000 on Sunday.

Public Health Administration

Long in advance of the games, State and local health authorities and the Olympic Organizing Committee, a nongovernmental agency responsible for staging the games, agreed that all public health matters would be handled as nearly as possible in the customary patterns of health administration in California. The health department of Placer County, in which Squaw Valley is located, would maintain legal jurisdiction over all public eating places, waste

disposal, small water systems, and communicable disease control. The California State Department of Public Health would exercise its legal responsibility regarding large water supplies and sanitary features of installations on State-owned land. It would also be available for consultation to both the Placer County Health Department and the Olympic Organizing Committee on all public health questions.

Representatives of these agencies held 12 planning meetings, beginning in December 1958. Some of these were attended also by representatives from the regional water pollution control board, the California State Division of Housing, the Nevada State Health Department, and the health departments of the adjacent counties of El Dorado and Nevada. The meetings dealt initially with basic sanitation and later with housing, preventive medical services, and provision of public health staff during the games. (General medical care was not part of the public health responsibilities.) Cooperation between the State and local health authorities and the medical division of the organizing committee was excellent. The organizing committee provided office space for the local health department staff during February and paid half the cost of their lodging and meals.

Local health department staff resident at the games site for the entire month consisted of two sanitarians for daily inspections of eating places, housing, and other sanitary installations in Squaw Valley and the surrounding area, one public health nurse for work in isolation and investigation of communicable diseases, and a medical officer to direct the health activities and carry out a surveillance program on communicable diseases. A sanitary engineer from the State health department worked periodically at the games, and a reserve force of State health department physicians, nurses, sanitarians, and statisticians stood ready to come in on short notice should a severe disease outbreak or other public health emergency occur. The local public health bacteriology laboratory was available 80 miles away at the county seat, and the State virus laboratory 200 miles away was alerted to receive specimens of suspected viral diseases.

By advance planning and careful budgeting of time and funds the local health department was able to give complete coverage to the Olympic events without significant sacrifice in existing programs or sizable expenditure of funds. The only special expense was $875 toward food and lodging of the resident staff.

Environmental Sanitation

As part of the permanent facilities constructed for the Olympic Games, a full-treatment sewage disposal plant costing half a million dollars was erected in the valley. Treatment at this plant, designed for a peak capacity of half a million gallons of sewage a day, consists of primary and secondary sedimentation, biofiltration, and postchlorination with disposal of effluent into a recharge filter 12 feet underground and 100 feet distant from Squaw Creek, the main drainage channel of Squaw Valley.

Squaw Creek is a tributary of the Truckee River, which is a source of domestic water supply for the city of Reno. Because of the sewage treatment plant's proximity, water samples were collected from the creek above and below the plant and tested for coliform bacilli before and again during the games. Except for one weekend when the plant was grossly overloaded, the plant functioned efficiently and no contamination of water occurred.

The more than 100 private homes in Squaw Valley, many of recent construction, were served by individual septic tank disposal systems. All septic tanks were subject to rigorous regulations and inspections by the county health department, and there were no reports of failure during the games. State and local health officials also worked closely with officials of the three sewer districts in the Lake Tahoe area to insure optimum operation during such abnormally heavy winter loading.

Water supply for the main Olympic facilities, except the private ski lodge, was obtained from three cased wells more than 100 feet deep located in the floor of Squaw Valley. Results of frequent bacteriological sampling during the previous year were good; however, chlorination was also provided as an additional safeguard. Chlorine residual was tested daily by the resident sanitarians and ranged from a trace to 0.5 ppm on all days except February 8 and 17, when no residual was found. Breakdown of

the chlorinating equipment and delay in obtaining the necessary parts accounted for the lack of chlorine residual on February 8.

The water supply for the private ski lodge was derived from surface runoff collected from a dam on a tributary of Squaw Creek high on the ski slopes within an unprotected watershed. The local health department was instrumental in getting the owners to install a chlorinating system before the Olympic Games, and the equipment was operating successfully at the beginning of February. On February 7 a heavy rainstorm washed mud and debris into the reservoir and caused temporary failure of the system. Turbid water was detected in this supply for 2 days until negotiations were completed for a temporary connection by fire hose to the main Olympic water supply.

Houses on the floor of the valley were supplied by two mutual water systems using ground sources. These were operated under permit and surveillance of the local health department and were considered safe without chlorination. State and local health officials during the previous year had worked closely with small and large water systems in the Lake Tahoe-Truckee area in order to bring inadequate systems up to a reasonably safe standard. These efforts were generally successful, and many of the systems received permanent improvements.

Food service facilities consisted of a large cafeteria in the athletes' center which could serve 1,000 persons at a time; short-order restaurants at two spectator centers which served sandwiches, hamburgers, soft drinks, and fountain and alcoholic beverages; dining rooms at two private lodges housing officials; and several mobile huts and concession stands serving hot dogs and hot drinks. The restaurants at the spectator centers and the mobile huts were leased to a private concessionaire; the lodge dining rooms were under the usual private managements; and the athletes' cafeteria was under direct operation of the Olympic Organizing Committee. All the eating facilities were operated under permit by the Placer County Health Department, and as a result of excellent cooperation between the organizing committee and the health officials all structural features were satisfactory by the beginning of February.

To insure optimum operation, each food-processing center was visited daily during the month by a resident sanitarian, but few corrections were necessary. Inspections covered temperature of dishwater and refrigerated storage units, rinse-water disinfecting procedures, food-handling techniques, appearance and cleanliness of food-handling personnel, cleanliness of meat choppers, cutters, and other utensils, protection of storage areas from rodents, and other items of general food sanitation. Larger than normal quantities of food and dishes necessitated use of booster units on the dishwashing apparatus to insure the required 180° F. temperature of the rinse water.

All the restaurants in the surrounding area were inspected at least once in the fall of 1959 and again in January 1960. During February they were visited every 2 to 5 days by a resident sanitarian. Some of the restaurants required a more frequent and more thorough check than others because they were trying to accommodate unusually large numbers of people with relatively antiquated equipment.

Through the combined efforts of the California State Division of Housing and the local health and building departments in the Squaw Valley area, inspection surveys of all public housing facilities were made. The bulk of the inspections, nearly 150, were made by the area representative of the State division of housing. The local building inspectors and sanitarians jointly inspected a smaller number of establishments, including apartment houses, hotels, and ski lodges, which by law are under the jurisdiction of the localities. Specific items checked by sanitarians were window area, general maintenance, exhaust systems, venting of gas heaters, toilet facilities, sewage disposal, storage of garbage and trash, vector control, water supply, food handling, occupancy, and fire hazards.

Inspection reports, submitted well in advance of the games, showed that housing in the area was good. Most of it was of fairly recent construction. The local health department held several meetings regarding room occupancy with the organizing committee, which was guaranteeing housing to spectators at fixed rates and making arrangements for housing certain officials. California State law requires a minimum of 630 cu. ft. for the first two persons

and 500 cu. ft. for each additional person in a sleeping room, but the local health officer may lower the 500-cu. ft. requirement for temporary recreational facilities. After consultation with the communicable disease and housing specialists of the State department of public health, 400 cu. ft. was set as the minimum for all dormitories of the Olympic facilities, as well as rented housing and the three school buildings used for dormitories. With other safeguards, such as staggering of bunks head to foot and a minimum of 3 feet between bunks, this requirement was considered a reasonable balance between the need for health protection and the desire to accommodate as many people as possible.

The resident sanitarians made routine checks of the public housing in the area to make sure the occupancy requirement was met. Overcrowding in one of the converted school buildings had to be corrected by removal of some of the beds to another sleeping area. The sanitarians also checked general housekeeping, trash removal, safety hazards, plumbing, and bedding, but practically no difficulty with these conditions was encountered.

One exception concerned 18 trailers parked behind the ski lodge during the month of February. Connections to the sewer had been hastily and poorly executed, but through persistence of the resident sanitarian satisfactory corrections were finally made.

The organizing committee arranged with the private franchise holders in the area for daily collection of all garbage and trash. Except for a day or two when snow made removal difficult, collection proceeded satisfactorily during the month.

Communicable Disease Control

In February 1959, a year before the games, skiing and skating trials were held in Squaw Valley, using the partly completed Olympic facilities. These events offered an opportunity to test the efficiency of the administrative organization and the soundness of the plant and athletic facilities. They also provided a chance to observe what types of public health problems might be encountered.

The trials took place just as a wave of Asian influenza began in the United States, and indeed an epidemic of Asian influenza occurred among the contestants and officials at the trials. The outbreak was studied carefully, and after the events a survey was made of nearly all the persons residing in the dormitories. Approximately one out of six was sufficiently ill to report for treatment to a medical aid station, and two out of six reported some illness on survey.

Clearly, an epidemic with a 33 percent attack rate could exert an extremely adverse influence on the course of the games in 1960. Therefore, a full-scale immunization program was planned, and special attention was given to the spacing and configuration of bunks and the amount of airspace per person available in the sleeping quarters.

In November 1959 an immunization program against influenza for officials, employees, and contestants was begun. Through the office of the medical director of the organizing committee, memorandums were sent to all persons officially connected with the Olympic Games advising them to obtain inoculations against influenza from their private physicians. As an added incentive, the organizing committee provided free inoculations in Squaw Valley on December 9, January 6, and February 3 and in San Francisco on December 4 and January 8.

A total of 490 persons received one or more inoculations against respiratory disease at the free clinics. A placebo and three types of vaccine, donated by the Parke-Davis Company, were used: polyvalent influenza vaccine, polyvalent influenza vaccine combined with adenovirus strains 3, 4, and 7, and this combination further combined with two strains of parainfluenza (nine-strain vaccine).

According to data provided by the medical aid stations, 57 of the 490 persons inoculated became ill during February, an attack rate of 7.6 percent. As shown in the table, the differences in attack rates between persons receiving vaccine containing adenovirus and those receiving only influenza vaccine or placebo were extremely small. Assuming that the sample was drawn from a normal population and examining the results by analysis of variance, however, the small observed differences could be shown to be statistically significant.

No data were available for persons who were vaccinated by their private physicians.

Since respiratory illnesses as such are not required by law to be reported in California, it was necessary to arrange special machinery to follow the progress of any respiratory illness which might attack the artificial Olympic community. A surveillance procedure was set in operation on February 1 and was continued through the month. At five medical aid stations in the valley and at the field hospital, special data cards were to be filled out for any person seeking treatment for a respiratory illness. The data included the person's name, home city, local address, age, sex, date of onset, and date of arrival in Squaw Valley, as well as clinical diagnosis. As a double check, all medical records were reviewed daily by the public health physician to insure that no cases of any communicable disease escaped notice. It was thus possible to compare the number of cases of respiratory disease observed with the size of the population at risk at any given time. As the number of Olympic officials, volunteers, and contestants increased from about 1,000 on February 1 to about 5,000 on the opening day of the games, cases of respiratory disease increased from 2 or 3 a day to an average of 25 a day.

With the exception of a slight peak on the weekend of February 22, the amount of respiratory illness was consistently proportional to the number of Olympic officials in the area at the time. About one new case occurred for every 200 persons at risk each day. However, on the basis of the experience during the 1959 trials, which showed that only half the persons ill with respiratory disease presented themselves for treatment, the true incidence in 1960 was probably closer to one new case for every 100 individuals.

Throat washings were collected from five persons showing typical clinical influenza and were tested for influenza by the State virus laboratory. Three of the five were positive for influenza type A2. Two of these patients were U.S. skaters, who had arrived from Seattle, Wash., on February 1 and the third was an Austrian team official, who arrived on February 11.

Altogether there were 425 cases of respiratory disease during February. Only 38 were diagnosed as typical influenza. Two hundred and sixty-four were upper respiratory infection or pharyngitis, and the remaining 175 were such illnesses as streptococcal sore throat, bronchitis, laryngitis, or sinusitis.

Respiratory illness in 1960 appeared to be endemic, in contrast to the experience in 1959 when it was epidemic. Although Asian influenza was present in 1960 from the start of February and cases continued to occur throughout the month, the disease never approached epidemic proportions. Reasons for the contrast with the 1959 experience are not entirely clear. The vaccination experience for the total population at risk is not known, but analysis of the data on the small number vaccinated in the

Respiratory disease among persons vaccinated, by type of vaccine and number of injections

Type of vaccine	One or more injections			One injection			Two injections		
	Total persons	Number ill	Percent ill	Total persons	Number ill	Percent ill	Total persons	Number ill	Percent ill
Total	490	37	7.6	265	23	8.7	225	14	6.2
Nine-strain vaccine	184	13	7.1	97	9	9.3	87	4	4.6
Polyvalent influenza vaccine with adenovirus strains	188	14	7.5	106	8	7.5	82	6	7.3
Polyvalent influenza vaccine	61	5	8.2	33	3	9.1	28	2	7.1
Placebo	57	5	8.8	29	3	10.3	28	2	7.1

clinics showed only slight, if any, protective effect. It does not appear likely therefore that vaccination alone prevented an outbreak.

There are two factors which may have contributed to the low incidence of influenza in 1960. One is that influenza virus had been well seeded in the State of California and the Reno area before February 1960. In fact, influenza morbidity had reached its peak in California by January 22. In 1959, by contrast, the virus was just starting to appear in the State about the time the trial events were held. The other factor would appear to be a greater dispersion of people in 1960. Whereas in 1959 all those associated with the games slept and took meals in the same place, in 1960 contestants and team officials slept and ate separately from other organizing committee personnel.

Because of the possibility of an unusual prevalence of infectious diarrhea, known to have occurred in this area in the past, as well as of food poisoning outbreaks, every case of gastroenteritis was scrutinized and a system for prompt reporting was devised. Only 42 cases of gastroenteritis were seen during the month. They were spread out in time, averaging about two a day. No more than four cases occurred in any single day. Detailed food histories were obtained on 10 of these cases, and in none was there evidence to suggest a common-source food poisoning outbreak. Imagining the disastrous consequence of a widespread outbreak of food poisoning in such a setting, one might surmise that the preventive health measures were effective.

In addition to respiratory illness and gastroenteritis, communicable diseases reported during the month included one case of mumps, one of german measles, and three of trench mouth. Considering the large population at risk and the excellent opportunity for transmission of illness through close association of people from all over the world, the number of cases of communicable diseases was gratifyingly small.

Summary

The 1960 Olympic Winter Games, held in Squaw Valley, Calif., provided a challenge to health authorities to meet the needs for expanded public health services. Sparsely inhabited with few public facilities, the valley had to prepare to house, feed, and amuse some 5,000 contestants and officials and tens of thousands of spectators. With the cooperation and assistance of the State health department and other health agencies in the area, the county health department (Placer County) worked to assure adequate sewage disposal facilities, a safe water supply, satisfactory housing, and sanitary eating places. It also initiated an influenza vaccination program and set up special surveillance procedures for all respiratory diseases.

Only 425 cases of respiratory disease, including 38 cases of influenza, occurred during the month of the games. Gastroenteritis, also of major concern in a setting such as this, was limited to 42 cases, with never more than 4 in a day. The low incidence of these as well as all other communicable diseases attests to the success of the efforts in environmental health and communicable disease control.

Measuring Social Restoration Performance of Public Psychiatric Hospitals

CHARLES E. RICE, Ph.D., DAVID G. BERGER, Ph.D., LEE G. SEWALL, M.D., and PAUL V. LEMKAU, M.D.

CURRENT INTEREST in assessing the performance of psychiatric hospitals is linked with the widespread conviction that, in expending their energies in day-to-day operations, social organizations may fail to attain the efficiency expected of them. A corollary belief is that systematic observation of such organizations may lead to recommendations for improving their performance.

At first sight it may appear necessary to use radically different methods of evaluating organizations with such diverse purposes as education, national defense, health and welfare, and industrial production. However, with the development of formal systems of operations research, logistics analysis, and management science, certain common dimensions of analysis have been found useful in assessing different types of social organization. One such dimension is organizational goals.

To use a goal orientation in appraising social organizations, it is necessary to determine the pattern of goals during a given period of operation, to define each goal, and to select the best available measures of organizational results to reflect effectiveness in the attainment of each goal.

Medical Audit Plan

The Medical Audit Plan for Psychiatric Hospitals, a research program designed to develop a method for appraising the effectiveness of public psychiatric hospitals, is being readied for application in a series of hospitals. The staff of the plan has been working to derive a set of goals that will represent the objectives of public psychiatric hospitals in our culture. Results of a nationwide survey indicate that, in the opinion of both the professional and lay public, social restoration and care of patients, protection of patients and public, education and training, research, and effective administration are prominent purposes in these institutions. This paper deals with social restoration, an important dimension in evaluating hospital performance.

To measure the social restoration performance of public psychiatric hospitals, it was necessary first to define social restoration in terms of hospital-patient events and then to develop a workable system for recording and measuring these events so that the procedure could be tested in a series of hospitals. If the system proved practicable, a rudimentary program for estimating social restoration performance would be formalized.

If the formal program proves to be applicable in public psychiatric hospitals, it could be the "foot in the doorway" to hospital evaluation, making it possible to catalog differences in treatment programs, staff patterns, patient

Dr. Rice, research psychologist, Dr. Berger, executive director, and Dr. Sewall, program director of the Medical Audit Plan for Psychiatric Hospitals, are located at the Veterans Administration Hospital, Perry Point, Md., where the study project is being carried on. Dr. Lemkau, co-director, is professor of public health, School of Hygiene and Public Health, Johns Hopkins University, Baltimore, Md.

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populations, structural features, and so on, in a series of public psychiatric hospitals, and to learn which hospital characteristics occur most frequently in combination with "satisfactory" social restoration results. A system of empirically based standards for the operation of such institutions could then be described in terms of social restoration. Other goals could be treated similarly.

Definition of Social Restoration

The principal purpose of the psychiatric hospital is often defined as the successful return of patients to the community. What, however, is a "successful return"? Is return to the community successful if the patient leaves the hospital by escape or unauthorized absence, if his posthospital behavior is severely disorganized, if he is subsequently readmitted or admitted to another institution, if he spends 10 years in the hospital before being discharged, or if he dies within a week after discharge? The definition we seek must establish the limits of hospital responsibility in the events and behavior which occur during and after the patient's release from the hospital. It must also conform to the basic principles of psychiatric hospital operation, so that the events and behavior observed have meaning and application in a large number of hospital settings.

The medical audit plan defines the social restoration goal of public psychiatric hospitals as maximal success in authorizing the release of patients who will not only remain in the community but also will make a favorable community adjustment.

The three levels of social restoration may be expressed as follows:

- To what extent is the hospital authorizing the return of patients to the community for the purpose of establishing extrahospital residence? With some minor reservations, this is akin to a "discharge rate" and may be designated level 1, the first and most rudimentary level of social restoration.
- To what extent do patients whose release from the hospital is authorized remain in the community? Quantification of this level would represent a "readmission rate." Adjustments must be made, however, for patients dying in the community after release from the hospital, as well as for patients subsequently admitted to other institutions. Level 2 of social restoration represents the capacity of the hospital to discharge patients who will remain alive in the community.
- To what extent is the hospital authorizing release to the community of patients who prove capable of a satisfactory extrahospital adaptation? The nature of the patient's adjustment to the community is the subject of level 3. No familiar statistic is applied to this level, which reflects the limited effort of public psychiatric hospitals in the followup of patients.

Before formulating a program for measuring the three levels of social restoration, two ancillary concepts are needed, the patient cohort and the description of the time intervals comprising the total study period.

Patient Cohorts

The study of hospital effectiveness in terms of social restoration focuses on patients departing from the hospital. Whether the hospital administrator is interested in the success of his hospital in releasing a selected class of patients, such as schizophrenics, married females, or alcoholics, or in the movement of all patients from the hospital to the community, the essence of the problem is identification of the reservoir of patients available for release. Cohorts of patients, made up of groups with distinctive traits or characteristics, such as those in a particular diagnostic rubric or within a prescribed age range, are a useful concept for this purpose (*1*).

In this project, two cohorts are used for measuring the social restoration performance of psychiatric hospitals: an admission cohort, assembled by assigning to it all patients admitted during a given time interval; and a resident cohort, made up of all patients in the hospital the day the research program is installed. By classifying patients in the resident cohort according to length of hospital stay, a series of second-order resident cohorts will be formed. In this way, a 1-year resident cohort as well as 2-year and longer cohorts will be identified in each hospital.

Interest in the admission and resident cohorts in each hospital centers on various forms of patient movement, both within and from the

hospital, as well as on the type of adjustment in the community demonstrated by patients discharged from both cohorts.

Since the rate of discharge for newly admitted patients is generally greater than for patients who have been in residence for a protracted period of time, an estimate of hospital success in the restoration of all types of patients is important. To use only recently admitted patients for estimating hospital success provides only a partial picture. The research program is designed to discover features in the hospital system which vary with social restoration performance. If the estimate of social restoration is based on a limited portion of the hospital population, such as a resident or an admission cohort, it would be necessary to decide what portion of hospital resources were expended in serving the specified cohort. Accurate apportionment of this expenditure in retrospect would be an extremely delicate task. The use of two cohorts provides a global picture of hospital social restoration capacity as well as one which should prove more rigorous and economical in operation.

Time Schedules

The study of a hospital's social restoration functioning may be divided into three time phases: collection, observation, and followup.

- The collection phase, necessary only for the admission cohort, is the period during which this cohort is assembled. It occupies the first 183 days, or 6 months, of project work in the cooperating hospitals. The admission cohort includes all patients entering the hospital during this interval except patients dying within 48 hours of admission.
- During the observation phase, each patient in both the admission and resident cohorts will be followed for a maximum of 274 days, or 9 months, to determine what happens to him (death in the hospital, transfer, discharge, and so on). For all resident cohort patients, the observation phase begins on the day the study is installed in the hospital; for admission cohort patients, on the day of admission during the collection phase.

The first day of a patient's hospitalization is symbolized by $P(A)1$ (A refers to admission). Each day of his hospital stay is similarly symbolized; for example, his 100th day of hospitalization is represented by $P(A)100$.

For all resident patients, $P(A)1$ is the first day of the study; it is as though all of these patients were admitted on the first day of project work in the hospital. For both resident and admission patients the observation phase extends, potentially, from $P(A)1$ to $P(A)274$. The observation phase is terminated whenever a change, such as death, occurs in any patient's status. Nine months, or 274 days, is merely the upper limit or time boundary for this phase.

- In the followup phase, for both the admission and resident cohorts, each patient placed on convalescent leave or given an authorized discharge by $P(A)274$ will be followed in the community for a period up to 9 months after release.

If we let $P(R)1$ (R stands for release) represent a patient's first day in the community, then the followup phase for him can extend to $P(R)274$ if he continues to adjust at some level throughout the 9 months. The followup phase closes for patients who are reinstitutionalized, or die, before $P(R)274$. It would be interesting to observe reinstitutionalized patients throughout the followup period, but this study is planned so that observation is discontinued when a significant change in a patient's status occurs.

The three time phases described are fundamentally "time samples" of on-going hospital-patient events. The time intervals are admittedly arbitrary, but limits must be imposed to measure hospital performance. The scheme outlined requires 2 years to carry the three phases to their prescribed time boundaries.

Measuring Social Restoration

Social restoration may be measured at three levels: by the number of patients who return to the community, by the length of their stay in the community, and by the posthospital adjustment of those remaining in the community.

Level 1

In level 1 of social restoration, the problem is to determine how many members of a given cohort are returned to the community during the observation phase of the study. To dis-

cover what happens to patients during this phase, patients in the two cohorts were subdivided into seven classes, as follows:

(1) d, died in the hospital by P(A)274.

(2) t, transferred from the hospital by $P(A)$274.

(3) r_{AMA}, released "against medical advice" by $P(A)$274.

(4) r_{elope}, released via elopement (escape or unauthorized absence) from the hospital by $P(A)$274.

(5) r_{MHB}, released with "maximum hospital benefit" by $P(A)$274.

(6) r_v, placed on trial visit, sometimes termed "convalescent leave" or "parole," but not including "day care" or "night care," by $P(A)$274.

(7) h, patients who had none of the above experiences but who remained in the hospital throughout the observation phase, although they may have been granted short leaves of absence, such as weekend passes.

Classes 1–6 include cohort patients discharged or released from the hospital, using the terms "discharge" and "release" in a broad sense. Classes 5 and 6 differ from classes 1–4 in that patients released with maximum hospital benefit and patients placed on trial visit are released because the hospital has decided they are "ready" to return to the community, at least on a trial basis. These hospital-approved releases are designated as R. Therefore R represents the number of cohort patients discharged with maximum hospital benefit or placed on trial visit before $P(A)$274.

Classes 1–4 include patients withdrawn from a cohort by means other than a hospital-approved release. W represents the number of these patients in a cohort.

To summarize, if N represents the total number of patients in a cohort, then $N=R+W+h$. A patient can be classified only according to the first event in his hospital experience after he enters the study. For example, a patient discharged with maximum hospital benefit is classified as r_{MHB} (or R) even if he is readmitted to the hospital a few days following his discharge.

These patient movement categories were developed for the medical audit plan research program and represent the minimum number of categories needed to appraise the social restoration performance of State hospitals. They do not conform to the category structure of any State hospital system but resemble most closely the classification instituted by the mental hospital statisticians participating in the work of the Model Reporting Area for Mental Hospital Statistics (*2*). While the categories have been reduced to a minimum, there will be settings where certain categories have no utility. This will be especially true for patients released against medical advice, since a number of States do not use the designation r_{AMA} for patients who leave the hospital on their own insistence. As with any classification procedure, the essential requirement is that category definitions be followed faithfully by each cooperating hospital.

Discharge rate. The extent to which a hospital gives its patients an opportunity to return to the community can be measured by two basic indices, a discharge rate and a length-of-stay measure. A discharge rate constitutes our primary level 1 index.

The term "hospital-approved release rate" is a more realistic and meaningful measurement of hospital functioning at level 1 of social restoration than the term "discharge rate" because it is based on cohort patients whose release is approved by the hospital. It also avoids "inflation" of the usual discharge rate, which happens when "patients discharged from the hospital" include discharges via death, transfer, and elopement.

Another advantage of the "hospital-approved release" concept is its inclusion of patients placed on trial visit. Although these patients remain on the hospital books and are technically not discharged, they represent "releases to the community," and should be included in any measure of the social restoration effectiveness of a hospital. In many respects, the major difference between the status of patients discharged as having received maximum hospital benefit and patients placed on trial visit is administrative definition. By and large, both classes of patients are released into the community because the hospital believes they are "ready" to attempt to adjust to community living.

The discharge rate is usually computed by

dividing the number of patients available for release during a given period of time by the total number of patients in the cohort:

$$\frac{\text{Discharges}}{\text{Discharges}+\text{nondischarges}} \quad [1]$$

(or total number of patients in the cohort)

If the concept of "hospital-approved release" is used, this ratio must be refined, so that it would read

$$\frac{\text{Authorized discharges}}{\text{Authorized discharges}+\text{nonauthorized discharges}+\text{nondischarges}} \quad [2]$$

(or total number of patients in the cohort)

If the symbols R, W, and h are substituted in ratio 2, it would read

$$\frac{R}{R+W+h} \text{ or } \frac{R}{N} \quad [3]$$

Ratio 3 contains yet another pitfall. Patients who die, transfer, or elope from the hospital (W's) are removed from the cohort and are not available for authorized discharge throughout the entire observation phase of the study. Inclusion of these patients in the denominator of the index results in a misleadingly low index of hospital performance. A correction factor is needed to modify the denominator so that it will more accurately represent the number of cohort members with an equivalent "availability" or exposure time for authorized discharge. When the exact date of departure of W patients is unknown or difficult to obtain, it is customary to assume that they are leaving the cohort uniformly throughout the observation period. This is tantamount to saying that W patients are spending, on the average, one-half of the observation phase in the hospital or that there are, in another sense, only one-half as many patients in the W category as there are in fact. The usual corrected denominator is on the order of

$$N-\tfrac{1}{2}W \quad [4]$$

However, since the exact date of withdrawal of W patients will be recorded for each patient in the study cohorts, assumption of a uniform rate of departure is not necessary. The sum of the days spent in the hospital by each patient withdrawn from the study divided by the number of such patients will produce an average period of exposure to hospital-approved release for patients leaving the hospital by means other than authorized discharge. Dividing the average exposure period by 274, the number of days in the observation phase, will give the average proportion of the observation phase which the W patients spent in the hospital before withdrawal from the cohort. Subtracting this proportion from unity will give the average proportion of the observation phase during which the W's were not exposed to the risk of a hospital-approved release. Symbolically, this correction would be expressed as

$$C=1-\frac{\frac{\text{Sum } Li}{W}}{274} \quad [5]$$

The only unfamiliar term is Li, which represents the number of days a withdrawn patient spends in the hospital before release. Multiplying C by W will yield the number of patients who were not available for release due to their withdrawal from the cohort. If the correction is integrated into index 3, the refined discharge rate, symbolized by $1a$, becomes

$$1a=\frac{R}{N-(C\times W)} \quad [6]$$

The denominator represents the number of cohort members who were in the hospital for an approximately equal time during the observation phase, and the index yields that proportion of these patients given hospital-approved releases (*3*). This proportion may be multiplied by 100 if a percentage is desired.

Table 1 shows hypothetical data on movement of patients and the computation of level 1 indices for each of two hospitals. Over a given length of time hospital A released 35 percent of the cohort patients who had spent equal periods of time in the hospital, while hospital B released 49 percent, or nearly half, of the cohort patients with equal exposures to hospital-approved release. The level 1 index would be computed for both admission and resident cohorts; thus, a hospital would be characterized by several indices.

Length of hospitalization. The primary level 1 index was developed in terms of the number of patients released into the community by

a hospital during a given period of time and is essentially a refined release rate. A somewhat different way of considering social restoration at level 1 is to ask, "How long are patients kept in the hospital?" The answer to this question involves a length-of-stay measure.

The secondary level 1 measure is merely the average length of stay of R and h cohort patients during the observation phase of the study. In the secondary level 1 approach, measurement is restricted to R and h patients. Inclusion of patients withdrawn from the cohort for reasons other than hospital-approved release would give a lower, and often less meaningful, result. For example, if a given cohort lost many of its members by death during the observation phase, a low mean length of stay would result.

If we let $1b$ represent the secondary level 1 measure, then

$$1b=\frac{\text{Sum } Li(R,h)}{R+h} \qquad [7]$$

The mean length of stay is computed for the admission cohort of a hospital and also for each resident cohort. For the resident cohort, the measure does not include the time spent in the hospital prior to the start of the study. This is a legitimate limitation because operation of the hospital system during the observation phase is the subject of the study. Any inferences about the relationship between hospital programs and hospital results will perforce be limited to the period which coincides with the observation phase. However, for purposes other than this research program, it might be more useful to calculate the average length of total hospital stay for the entire body of resident patients.

Table 1. Calculation of primary level 1 index based on hypothetical data

	Hospital A	Hospital B
(1) N (total number in cohort)	360	250
(2) r_{MHB} ("maximum hospital benefit" discharges)	22	26
(3) r_v (trial visits)	94	88
(4) $R=(2)+(3)$	116	114
(5) d (deaths)	18	14
(6) r_{AMA} ("against medical advice" discharges)	16	10
(7) t (transfers)	14	10
(8) r_{elope} (elopements)	7	5
(9) $W=(5)+(6)+(7)+(8)$	55	39
(10) $h=(1)-(4)-(9)$	189	97
(11) Average number of days in hospital for W's	120	155
(12) $C=1-\frac{(11)}{274}$	0.56	0.43
(13) $1a=\frac{R}{N-(C)W}=\frac{(4)}{(1)-(12)\times(9)}$	.35	.49

Collection of data for level 1 poses no particular problem other than stratifying the resident cohort by length of hospital stay and recording certain basic demographic information on these patients before the day the study is officially launched. From this point on, during the observation phase, it will be necessary to record the exact dates of admission and release for all patients in both admission and resident cohorts and to obtain the same demographic data on the admission cohort as on the resident cohort.

Level 2

The extent to which a hospital gives its patients a chance to return to the community is only part of the social restoration story. Patients released from the hospital have not necessarily been "socially restored"; they have only been given the opportunity to achieve this status. Followup activities, to learn what happens to patients released into the community, are essential for evaluating the "true effect" of hospitalization. Therefore, all cohort patients given a hospital-approved release (r_{MHB} *or* r_v) within the observation phase of the study will be followed in the community up to 9 months, or 274 days, after their release.

These R patients may be subdivided into smaller groups according to what happens to them following their release into the community. For example, they may die; they may return to institutionalized status, to the same or a different psychiatric inpatient facility or to a prison, a nursing home, or a home for the aged; or they may remain in the community throughout the followup phase of the study. This breakdown is valid for both the trial visit and maximum hospital benefit patients of both admission and resident cohorts.

The R group of a cohort will be broken down as follows:

(1) Rd, number of R patients who die in the community by $P(R)274$.

(2) Ri, number of R patients reinstitutionalized by $P(R)274$.

(3) Rs, number of R patients remaining in the community throughout the followup phase of the study.

As in the observation phase of the study, a patient is classified only once, according to his first hospital experience.

Readmission rate. The primary level 2 index is based on the question, "To what extent do patients whose release from the hospital is approved remain alive in the community?" This suggests use of a readmission rate analogous to the release rate developed for level 1, based on Ri, the number of R individuals of a cohort reinstitutionalized during the followup phase.

The primary level 2 index is

$$2a=\frac{Ri}{R-(C\times Rd)} \qquad [8]$$

where C in the denominator is a correction term. This correction is analogous to that used in the level 1 index and is necessary because some individuals will die in the community and thus will be withdrawn from the R group. The treatment of the Rd cases is similar to the treatment of the W's in level 1. The level 2 correction term is computed by dividing the average length of community stay, prior to death of the Rd individuals, by 274, the maximum potential duration of the followup phase, and then subtracting this result from unity.

The denominator of the primary level 2 index represents the number of R individuals in a cohort who had "equal exposure to the risk of reinstitutionalization." This index is computed for the admission cohort of a hospital and for each resident cohort. Subsequent admissions of cohort members to other institutions, as well as readmissions to the study hospitals, are recorded.

The computation of the level 2 index, symbolized by $2a$, may be illustrated by an example based on hypothetical data from two hypothetical hospitals (table 2).

For hospital A, 26 percent of the released patients who had "equal exposure to the risk of reinstitutionalization" had to return to an institution during the followup period. The figure for hospital B is 39 percent. Unlike the level 1 index, a low level 2 value represents "better hospital performance."

Although hospital B was giving more of its admission cohort patients a chance to return to the community than was hospital A, relatively fewer of hospital A's patients had to be reinstitutionalized during the followup phase. Therefore, it would be misleading to conclude, on the basis of the level 1 index, that hospital B was doing a better job than hospital A in "socially restoring" its patients.

Length of community stay. As in the secondary level 1 measure, the question "How long do those cohort patients who are released from the hospital remain in the community?" leads to a measurement of length of stay in the community.

This measure is simply the average number of days spent in the community by reinstitutionalized and authorized release members of a cohort during the followup phase of the study. The cohort members who died in the community are omitted from this computation because their inclusion would lower the value produced. This value might merely reflect the fact that a hospital has released a large

Table 2. Calculation of primary level 2 index based on hypothetical data

	Hospital A	Hospital B
(1) R (number of hospital-approved releases)	116	114
(2) Rd (number of released patients dying in the community during followup phase)	8	14
(3) Ri (number of released patients who were reinstitutionalized during followup phase)	28	40
(4) Rs (number of released patients who remained in the community throughout the followup phase)	80	60
(5) Average number of days in community for Rd patients	37	55
(6) $C=1-\frac{(5)}{274}$	0.86	0.80
(7) $2a=\frac{Ri}{R-(C\times Rd)}=\frac{(3)}{(1)-(6)\times(2)}$	.26	.39

number of elderly patients who died soon after their release and thus had no chance to remain in the community for the entire followup period or to be readmitted to the hospital. The secondary level 2 measure is computed for both the admission and resident cohorts of a hospital, as follows:

If $2b$ symbolizes the secondary level 2 measure, then

$$2b = \frac{\text{Sum } Lc(Ri,Rs)}{Ri+Rs} \qquad [9]$$

where the numerator represents the number of days spent in the community by the reinstitutionalized and authorized release cohort members (Lc=days in community) during the followup phase of the study, and the denominator represents the number of members of these cohorts.

Records of readmissions of previously released members of the patient cohorts are obtained from the daily roster of admissions in each cooperating hospital. The procedure for recording admissions to other institutions as well as deaths in the community is described under level 3.

Level 3

Measurement of the social restoration performance of hospitals in terms of the number of patients given an opportunity to resume community living and of the number of these patients who remain in the community provide valuable clues to hospital effectiveness. These measures, however, leave a number of important questions unanswered. For example, "Is hospital performance successful if discharged patients remain in the community because they or their families balk at returning them to the hospital or because the patients or their families find readmission procedures too complex?"

The most direct measure of hospital success and the measure which furnishes a qualitative estimate of the social restoration effectiveness of the hospital is the posthospital adjustment of patients in the community. To know how well patients adjust after they leave the hospital, however, is not enough. Information on their prehospital experience is needed as a baseline for evaluating their posthospital adjustment. With reliable information on both prehospital and posthospital adjustment, inferences can be drawn about the impact of the hospital experience on patients. In this way, patients serve as their own controls, and the role of the hospital in contributing to changes in the community adjustment of patient cohorts is evaluated.

At this point in the program, a number of decisions had to be made. Since it is more difficult and expensive to collect information on the community adjustment of patients than to record their movement in a hospital setting, the project staff adopted two basic tenets: (a) that community residents familiar with the patient and his adjustment, rather than the patient himself, serve as sources of information; and (b) that the information sought have to do with broad "areas of social living" rather than with symptom portraits or mental status examinations. Patients most often enter a public psychiatric facility because of public or legal pressure rather than by self-determination, and such pressure becomes necessary, in the main, when the patient's functioning in broad areas of social adaptation shows malignant trends, either in terms of harming himself or of harming others.

Considerable pilot work has been done with "community informant questionnaires," which were mailed to informants in the community at the time of the patient's admission to the hospital and again 3 months after he was discharged. The names and addresses of informants were furnished by the patient. This procedure is relatively inexpensive, it can be handled by clerical staff, and it requires no travel funds. The 3-month interval can be altered or repeated as desired. With patients in the resident cohort who have been in the hospital more than 1 year, only posthospital information was requested.

In one hospital, nearly 80 percent of the questionnaires requesting information about the prehospital adjustment of patients were completed and returned by community informants. For questionnaires requesting information on posthospital adjustment, the return rate was only about 70 percent.

The community informant questionnaires are so designed that they can also be used as interviewing schedules. The initial questions

concern identifying characteristics of the informant. The questionnaire is also used to determine whether the patient has died in the community or whether he was institutionalized again since his release from the hospital. The latter information will be used to supplement the data collected at the hospital for level 2 of social restoration. The majority of the remaining questions elicit information in four areas of social adjustment: social and family relations, social productivity (work, school, and other socially useful behavior), self-management (personal care and conduct), and antisocial behavior. Some questions ask the informant to indicate whether the patient has been engaged in a particular activity, such as work, and if so, to what extent. Other questions are structured in terms of comparison of the patient's behavior with the behavior of his peers in the community; still others ask the informant to indicate the patient's behavior by means of simple scales. Ideally, the same informants should complete both the prehospital and posthospital forms for a patient, but pragmatic considerations may force us to depart from this ideal.

There are a number of problems in the questionnaire approach. One concerns the appraisal of prehospital adjustment. Is hospital performance best measured by using as a baseline the patient's adjustment just prior to admission to the hospital or should the baseline be the point of most profound social disorganization, a point which may occur at a time other than just prior to admission to an institution? For this study, information was sought on the patient's adjustment during the 3-month period prior to his hospitalization. This avoids asking the informant to decide when the patient was most disturbed and has the additional advantage of providing information about him during the period immediately preceding the hospital's "taking over" his treatment.

Furthermore, the questions about prehospital adjustment must be parallel, or equivalent in content, to the questions asked during the posthospital followup program. For example, a question about work adjustment is designed to obtain information regarding the patient's work history during the 3-month period prior to his admission to the hospital and during a 9-month period following his release.

Other methods of gathering community adjustment information are being readied for pilot study. The method or methods which provide the most accurate information at the least cost per unit will be used in the full-scale research.

For members of the admission cohort, level 3 of social restoration may be measured by computing for each adjustment area the proportion of released patients who display a prehospital-posthospital improvement in social adjustment. Thus, the social productivity of these patients can be classified on the basis of information from prehospital questionnaires. Using a scoring scheme developed by the medical audit staff, the entire admission cohort of a hospital can be classified into five categories, ranging from high adjustment to low adjustment.

The information obtained from the posthospital questionnaires for admission cohort patients released during the observation phase of the study will be similarly classified. The number of patients released with hospital approval whose posthospital adjustment classification is higher than their prehospital adjustment classification can then be counted, and a hospital level 3 score for social productivity can be computed by using the formula

$$\frac{R(s) \text{ improved}}{R(s)} \qquad [10]$$

where $R(s)$ denotes the number of individuals in the group released with hospital approval who remain adjusting in the community at a specified time after release, and the numerator represents the number of such individuals who show a prehospital-posthospital improvement in social productivity. A similar proportion will be computed for each of the other three social adjustment areas.

Since prehospital information probably will not be obtained for resident cohort members, we must be content with a proportion such as

$$\frac{R(s)\ 1,2}{R(s)} \qquad [11]$$

where the numerator represents the number of $R(s)$ individuals classified on the basis of post-hospital information in the two top categories of an adjustment area. For the resident cohort, we cannot speak definitively about improvement in social adjustment.

Summary

Most people associated with psychiatric hospital work are eager to improve their performance. The usual dilemma is to know how. The Medical Audit Plan for Psychiatric Hospitals, a research program being carried on at the Veterans Administration Hospital, Perry Point, Md., is developing a set of goals for public psychiatric hospitals. The program is also attempting to establish measuring rods for determining how completely hospitals have achieved their objectives and to uncover the facets of hospital structure or programing which influence the degree to which objectives are achieved.

This paper discusses one objective of the program, social restoration, defines this objective, and describes a system for recording relevant hospital-patient events. It also considers characteristics for measuring these events, proposes indices for estimating hospital restoration results, and suggests similar treatment of other hospital objectives.

Application of this methodology is being planned for a series of State hospitals. If the approach proves practicable, and if it yields meaningful information about hospital organization, it should be possible to make program adjustments in psychiatric hospitals with the hope of improving end results of the hospital effort.

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Psychiatric Case Register

The first complete psychiatric case register for a State has been established by the Maryland State Department of Mental Hygiene in conjunction with the Maryland State Department of Health and the National Institute of Mental Health of the Public Health Service. The register will contain essential data on all Maryland residents who receive psychiatric treatment in hospitals and clinics.

By providing a running record of all psychiatric services received by each individual, the register will permit analysis of the effectiveness of these services for various categories of patients. All information on patients will be kept in strict confidence and used only for research purposes. The register also will make it possible to compute, for the first time, an unduplicated count of Maryland residents receiving psychiatric services.

The mental hygiene department is responsible for all psychiatric hospital statistics. As part of this project, it will assume full responsibility for all psychiatric clinic statistics and will shortly begin releasing regular monthly and annual reports. However, most psychiatric clinics will remain under the supervision of the State health department.

Danield Widelock, Ph.D.
Joseph Portnoy, Ph.D.
John Truelove
Anna D. Reynolds, B.A.
Jules Vandow, M.D.

THE USR TEST AS A SCREENING TEST IN A PUBLIC HEALTH LABORATORY

EVERY public health laboratory may be confronted with two problems with respect to syphilis serology: mounting costs and the biologic false positive reaction. The New York City Department of Health is attempting to solve these problems simultaneously.

For several years the procedure in the syphilis serology laboratory has been to screen test annually about 700,000 specimens by the VDRL slide test. All reactive serums are further tested by the Kolmer complement fixation test and titrated by the VDRL slide technique.

The major problem in performing such large numbers of tests is in the routine preparation of the specimens. This preparation requires space and the time of personnel for centrifugation of the blood, decanting of the serums, relabeling of the thousands of serum tubes, and finally the heating of the serums for 30 minutes.

The rapid plasma reagin (RPR) test (*1*) suggested the possibility of eliminating many of the time-consuming features of conventional serology. With the adaption of the test for use with unheated serum (*2,3*) instead of plasma, it appeared useful to study the value of the unheated serum reagin (USR) test as a screening procedure in a public health laboratory. Serum does not require special tubes with anticoagulants and is suitable for use in standard tests for syphilis as well.

If we could substitute the USR test for the VDRL slide test in our screening procedure, our laboratory would save space, personnel, and time. Some of these savings could be used to amplify our syphilis serology with treponemal testing.

A large-scale study of the USR test was undertaken in comparison with the VDRL slide test. Treponemal testing of a smaller sample of specimens was also done to obtain information that would aid in the selection of a treponemal test for confirmatory purposes. As a result of this study a suggested routine for a public health laboratory is presented.

Dr. Widelock, Mr. Truelove, and Mrs. Reynolds are with the bureau of laboratories and Dr. Vandow is with the bureau of preventable diseases, New York City Department of Health. Dr. Portnoy is assistant director, Venereal Disease Research Laboratory, Communicable Disease Center, Public Health Service, Chamblee, Ga. He was formerly with the Public Health Service Venereal Disease Experimental Laboratory and the department of experimental medicine, University of North Carolina School of Public Health, Chapel Hill.

Methods

One hundred thousand blood specimens routinely received by the syphilis serology laboratory were screen tested by both USR (*2,3*) and VDRL slides tests (*4*). The USR test was performed on slides with paraffin rings 14 mm. in diameter, using 0.06 ml. of serum and 0.02 ml. of antigen suspension. All serums reacting (reactive or weakly reactive) by either test were further tested with the Kolmer complement fixation test (*4*), substituting plastic trays for test tubes (*5*), and in addition a selected number of specimens were examined with Reiter protein and tpcf-50 complement fixation tests (*4*).

Reiter protein antigen was supplied by the Public Health Service Venereal Disease Research Laboratory, Chamblee, Ga., and the test was performed in the serology laboratory of the New York City Department of Health.

The tpcf-50 test was performed at the Public Health Service Venereal Disease Experimental Laboratory, Chapel Hill, N.C.

Clinical diagnoses on the 1,885 patients who were tested with treponemal antigens were obtained through the New York City bureau of preventable diseases, division of social hygiene. The clinician was aware only of the results of the VDRL and Kolmer tests at the time the diagnosis was considered.

Results

Table 1 presents the results of simultaneous testing of 100,000 specimens of blood by both the USR and VDRL tests. Essentially similar percentages of reactivity were obtained with each procedure, and agreement between the two was 98.2 percent. Less than 1 percent of the specimens were reactive with USR and nonreactive with VDRL, and vice versa.

Split blood specimens on 1,885 patients for whom diagnoses were available were tested with the USR and VDRL techniques. Both tests were reactive and results were in agreement with the diagnosis in 92 percent of the cases of clinical syphilis (table 2). Somewhat lesser agreement was noted in latent syphilis. Both tests were reactive in about 62 percent of the cases diagnosed as biologic false positive. It must be emphasized that the clinician knew only the VDRL and Kolmer test results when making the diagnosis.

In order to determine the value of performing multiple tests on any one serum, the results of five tests were correlated with clinical opinion. The percentage of reactors was determined for each test when one or more of the other tests were reactive. When the clinician made a diagnosis of clinical syphilis, and the USR test was reactive, 91.7 percent of the serums were also reactive by the VDRL tests; 74.5 percent by the Kolmer test; 71.1 percent by the RPCF test; 71.2 percent by the tpcf-50 test; and only 58.7 percent by both RPCF and tpcf-50 tests. Similarly, if the USR, VDRL, and Kolmer tests were all reactive, 84.2 percent of the RPCF tests, 83.7 percent of the tpcf-50 tests, and 73.2 percent of both the RPCF and tpcf-50 tests were reactive.

Thus various combinations of test results obtained in this laboratory make possible determination of the probability of other tests being reactive in clinical syphilis, in early latent syphilis, in late latent syphilis, and in those cases considered as not syphilis by the clinician (tables 3–6).

Table 1. Results of testing 100,000 blood specimens by the unheated serum reagin (USR) and VDRL techniques

Reactors	Number	Percent
USR [1]	10,047	10.04
VDRL [1]	9,966	9.96
USR, VDRL, or both +	10,884	10.88
USR+, VDRL+	9,129	9.1
USR−, VDRL+	837	.84
USR+, VDRL−	918	.92
USR−, VDRL−	89,116	89.1

[1] Reactive or weakly reactive.

NOTE: Plus sign (+), reactive or weakly reactive; minus sign (−), nonreactive.

Table 2. Estimated agreement [1] between results of tests of 1,885 split blood specimens tested by unheated serum reagin (USR) and VDRL techniques, by stage of syphilis

Stage of syphilis	Number specimens tested	Percent USR and VDRL results in—	
		Agreement	Disagreement
Clinical	129	91.7	8.3
Primary	26	81.6	18.4
Secondary	37	95.5	4.5
Congenital	40	94.5	5.5
Late	26	93.7	6.3
Early latent	124	87.2	12.8
Late latent	1,106	89.8	10.2
Undetermined	343	80.8	19.2
No case (BFP) [2]	183	61.8	38.2
Total	1,885	84.4	15.6

[1] Tests were considered to be in agreement when a reactive or weakly reactive reaction in one test was accompanied by a reactive or weakly reactive reaction in the other test.

[2] Biologic false positive.

Discussion

It is evident that the USR test, employing unheated serum, may be substituted for the

VDRL test as a screening procedure. It must be emphasized that no screening test will detect all reactive serums. A certain percentage of serums will be reactive by one test and nonreactive by another, and vice versa. However, the USR test will select at least as many reactors as does the VDRL slide test. The advantage of using the USR rather than the VDRL test lies in the lower cost of processing the serums when large numbers of specimens are tested.

In the New York City Department of Health serology laboratory, by eliminating the necessity for long centrifugation, pouring of serums, labeling of serum tubes, and inactivating of serums, we have freed one laboratory room and several technicians for other purposes. In addition we are able to start processing the "negative" (nonreactive) reports earlier in the day.

The determination of biologic false positive results is facilitated by the use of treponemal tests. Of the many treponemal tests (*3–6*) the complement fixation test with Reiter protein antigen seemed the most likely choice because of its low cost, sensitivity, specificity, and adaptability. The results obtained with treponemal antigens were not too revealing since determination of the treatment status of each

Table 3. Serologic results on 129 patients with clinical diagnosis of primary, secondary, congenital, or late syphilis [1]

If serology result was—	Percent of specimens reactive [2] by—					
	USR	VDRL	Kolmer	RPCF	tpcf-50	RPCF and tpcf-50
USR +		91.7	74.5	71.1	71.2	58.7
VDRL +	91.7		76.6	72.0	74.1	65.1
USR +, VDRL +			74.4	73.2	76.5	72.0
USR +, VDRL −			[3]	[3]	[3]	[3]
USR −, VDRL +			[3]	[3]	[3]	[3]
USR +, VDRL + Kolmer +				84.2	83.7	73.2
USR +, VDRL + Kolmer −				62.8	55.9	45.4

[1] Clinician was aware of results of VDRL and Kolmer tests only.
[2] Includes weakly reactive.
[3] Numbers too small to determine percentages.

NOTE: Plus sign (+), reactive or weakly reactive; minus sign (−), nonreactive.

Table 4. Serologic results on 124 patients with clinical diagnosis of early latent syphilis [1]

If serology result was—	Percent of specimens reactive [2] by—					
	USR	VDRL	Kolmer	RPCF	tpcf-50	RPCF and tpcf-50
USR +		94.7	84.5	71.4	76.5	63.6
VDRL +	82		84.9	64.7	69.6	58.0
USR +, VDRL +			83.1	61.9	62.8	55.4
USR +, VDRL −	[3]	[3]	[3]	[3]	[3]	[3]
USR −, VDRL +			90	32.2	32.1	23.0
USR +, VDRL + Kolmer +				74.7	78.3	69.4
USR +, VDRL + Kolmer −				58.3	72.6	50.0

[1] Clinician was aware of results of VDRL and Kolmer tests only.
[2] Includes weakly reactive.
[3] Numbers too small to determine percentages.

NOTE: Plus sign (+), reactive or weakly reactive; minus sign (−), nonreactive.

case was not made and the diagnosis of biologic false positive was made to a great extent on the results of VDRL and Kolmer tests. Tables 3–6 indicate that the RPCF test was similar in reactivity to the more expensive tpcf-50 test, though it was not equally sensitive or specific on all serums. In the present state of our knowledge it appears advisable to perform additional treponemal tests when the RPCF test is found to be nonreactive (*7,8*). A test using the Nichols strain of *Treponema pallidum* would be desirable. Although it would be desirable to perform the TPI test (*9*), because of the many years of clinical experience with it, its expensiveness and complexity limits its usefulness in a public health laboratory. For this reason it is planned to use the fluorescent treponemal antibody (FTA) test (*10*).

Table 6 shows serologic results for the 183 patients in table 2 diagnosed as "no case (BFP)." It will be recalled that the physicians were aware of results of the VDRL and Kolmer tests, in addition to the clinical findings, but had no information on results of the treponemal tests. Of the group of serums whose serology was reactive by USR, VDRL, and Kolmer tests, 40 percent were RPCF reactive; 43.3 percent, tpcf-50 reactive; and 30 percent were both RPCF and tpcf-50 reactive. Thus a certain number of patients were considered as

Table 5. Serologic results on 1,106 patients with clinical diagnosis of late latent syphilis [1]

If serology result was—	Percent of specimens reactive [2] by—					
	USR	VDRL	Kolmer	RPCF	tpcf-50	RPCF and tpcf-50
USR +		82.4	69.8	76.4	70.9	60.0
VDRL +	88.6		72.1	74.5	70.5	55.1
USR +, VDRL +			73.5	76.3	71.8	60.3
USR +, VDRL −			26.4	77.4	62.6	56.8
USR −, VDRL +			60.8	59.8	52.2	46.2
USR +, VDRL + Kolmer +				85.8	83.1	76.3
USR +, VDRL + Kolmer −				49.8	40.1	35.9
USR +, VDRL − Kolmer −				72.0	62.8	55.3
USR −, VDRL + Kolmer −				50.0	50.0	33.3

[1] Clinician was aware of results of VDRL and Kolmer tests only.
[2] Includes weakly reactive.
NOTE: Plus sign (+), reactive or weakly reactive; minus sign (−), nonreactive.

Table 6. Serologic results on 183 patients clinically diagnosed as "not syphilis" [1]

If serology result was—	Percent of specimens reactive [2] by—					
	USR	VDRL	Kolmer	RPCF	tpcf-50	RPCF and tpcf-50
USR +		57.8	11.1	44.5	40.1	30.6
VDRL +	78.9		14.6	39.5	39.1	27.0
USR +, VDRL +			18.0	44.5	41.9	31.3
USR +, VDRL −			2.8	44.4	39.2	29.0
USR −, VDRL +			21.5	20.0	29.1	10.6
USR +, VDRL + Kolmer +				40.0	43.3	30.0
USR +, VDRL + Kolmer −				45.2	41.2	31.1
USR +, VDRL − Kolmer −				43.5	35.8	27.5

[1] Biologic false positive. Clinician was aware of results of VDRL and Kolmer tests only.
[2] Includes weakly reactive.
NOTE: Plus sign (+), reactive or weakly reactive; minus sign (−), nonreactive.

not syphilitic even though the USR, VDRL, Kolmer, RPCF, and tpcf-50 all were reactive. Similarly, we have indication of serums that were reactive by the USR, VDRL, RPCF, and tpcf-50 tests but were negative by the Kolmer technique, and these cases too were considered as not syphilis. It is reasonable to suspect that a certain number of these cases might have been considered as latent syphilis, instead of as biologic false positives, if the clinician had been aware of the results of the treponemal tests.

The clinician needs the results of a quantitative test to enable him to follow the patient under treatment. The simplest method in our hands is the titration of the serums by the VDRL slide test. With this technique we are simultaneously cross-checking our USR reactors by another cardiolipin slide test. This cross-checking is important, since it enables the serology laboratory to identify mechanical laboratory errors occurring while culling the serums in the screening procedure and rechecking if discrepancies are found.

The present laboratory practice in New York City is summarized as follows:

The USR test, in which unheated serum is pipetted directly from the supernatant above the blood clot, is employed as a screening test (*1*). Enough antigen is prepared for 1 week and preserved in the refrigerator (4°–6° C.). A quantity sufficient for the needs of the day is allowed to reach room temperature and is tested against serums of known reactivity. Tests are read microscopically at 100× magnification, and recorded as:

Reactive=large clumps
Weakly reactive=small clumps
Nonreactive=no clumping

All nonreactors are reported to the physicians as "Slide test—negative." USR reactors are further tested by the quantitative VDRL slide test and by the Kolmer complement fixation test (*4*), substituting the plastic trays for test tubes (*5*). The RPCF may be substituted for the Kolmer test. The RPCF and the FTA tests will be used by this laboratory on specimens requiring further testing. We are giving serious consideration to incorporating the RPCF as a routine to be performed simultaneously with the Kolmer test.

Reports to physicians include the results of each of the tests performed, including the VDRL titer.

Summary

In the New York City Department of Health serology laboratory, 100,000 specimens of blood were tested simultaneously by the unheated serum reagin (USR) and VDRL slide tests. All reactors were further tested by the Kolmer complement fixation test.

About one-third of the reactors to the USR or VDRL tests, or to both, were also tested by the Reiter protein complement fixation (RPCF) and the *Treponema pallidum* complement fixation 50 test (tpcf-50). Clinical diagnoses were correlated with the serologic results.

The USR test may be used as a screening test, with a resultant saving of time, space, personnel, and money.

A public health laboratory procedure may consist of: (*a*) use of the USR as a screening test, all negative serums to be reported immediately, all USR reactors to be further tested; (*b*) further testing to consist of VDRL titration, Kolmer complement fixation test, and Reiter protein complement fixation test; and, (*c*) if the additional testing is required, employment of the Nichols strain of *T. pallidum* in an approved test, the fluorescent treponemal antibody (FTA) test, for example.

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Accidental Drownings at Home

Deaths from accidental drowning in the United States in 1958 totaled 5,605, almost 11 percent of the 47,300 deaths from all nontransport accidents. Drownings at home accounted for 407 of these deaths. The estimated distribution by place of accident based on a sample of 85 death certificates, is shown below.

Place at home	*Number*
Bathtubs	140
Swimming pools	62
Wells, cisterns, or cesspools	57
Other open bodies of water	62
Miscellaneous specified	38
Unspecified	48
Total	407

About three-fifths of the decedents were less than 5 years old, with half no more than 2 years old. In every eight drownings, one decedent was 5 to 19 years old, and one was 20 to 44 years old.

By place of drowning, children under 5 years accounted for 39 percent of the deaths in swimming pools; 49 percent in bathtubs; 60 percent in wells, cisterns, or cesspools; 93 percent in other open bodies of water; and 100 percent in miscellaneous specified places. Of an estimated 38 drownings of infants, 29 occurred in bathtubs.

Deaths in specified places numbered an estimated 96 persons aged 20 years or over: 55 percent in bathtubs, 25 percent in swimming pools, and 20 percent in wells, cisterns, or cesspools.

The comparatively low percentage of deaths occurring in swimming pools to the under 5 age group may indicate that these places are more likely to be protected against accidental entry by very small children. In the sample, other open bodies of water included four ditches, five fishponds, a lake, a creek, a hole filled with water, and a pool. In only one instance in the sample was construction of the swimming pool specified, that being a plastic pool for which no size was stated.

How seemingly innocent objects can be hazardous to very small children is illustrated by the eight deaths of children aged 2 years or younger which were assigned to miscellaneous specified places in the sample. Three of these drownings were in tanks and one in a tub of unstated size or purpose. The others happened to a 10-month-old child in a 5-gallon bucket and to 1-year-olds in a 5-gallon can, a bucket, and a 20-gallon crock.—WARREN W. MORSE, *analytical statistician, National Office of Vital Statistics, Public Health Service.*

Detecting Viruses on Nonporous Surfaces by Use of the Cotton Swab Technique

KENNETH KELLER, M.S., HERSCHUL BRASPENNINCKX, B.S., and MORTON KASDAN, B.S.

ALTHOUGH standards of sanitation are currently predicated on bacterial assay of surfaces, bacteria represent only one group of disease-producing agents that may be transmitted via "eating utensils." A surface that has been sanitized by the application of various bactericidal agents may still present a health hazard from the viewpoint of viable residual viruses. It is well established that many bactericidal agents are not active against all viruses, consequently an eating utensil after treatment with such an agent may be relatively free of viable bacteria, while at the same time its virus population may remain unaffected.

This investigation was undertaken to determine the sensitivity of the conventional cotton swab-rinse technique in detecting viruses on nonporous surfaces. The efficient removal of viruses from such surfaces is considered to be an essential prerequisite for future studies in the sanitization of eating utensils from a virological point of view.

Little has been published on the precision of virus detection methods applicable to fomites. Parker and MacNeal (*1*), in their experiments on the persistence of influenza virus on the human hand, used a glass petri dish as a control surface. In an effort to remove the virus from both of these surfaces, they simply rinsed the sample areas with 0.4 ml. of saline and used this rinse as an inoculum for their test hosts. Their results were somewhat variable. Consequently, it is difficult to evaluate the sensitivity of this saline elution method.

Edward (*2*) studied the resistance of influenza virus to drying, using three different fomites: cloth, dust, and glass. Each material was soaked for 15 minutes in 5 ml. of nutrient broth, and the broths were assayed for virus activity. As one would anticipate, only a 10 percent recovery of virus was obtained from cloth and dust, while the recovery from glass was almost quantitative.

Chapman and Vinsel, in a paper presented at the 1956 meeting of the American Public Health Association, reported that the cotton swab method is of a high order of sensitivity in virus detection. However, their sensitivity data did not indicate the number of ID_{50} doses of influenza virus that were applied to the surfaces of the dishes before recovery by the swab was attempted. (An ID_{50} dose is that dose of virus which infects 50 percent of the test animals.) The other test virus employed by Chapman and Vinsel was bacteriophage T1. However, with bacteriophage T1, sample areas were simply estimated, not accurately demarcated.

While the work of Chapman and Vinsel did indicate the possibility of using the cotton swab for virus detection, it was felt that a more quantitative approach to the problem should be undertaken.

Materials and Methods

Two test viruses were used in this study: coliphage T1 and poliovirus type 1. Bacteriophage was selected as an indicator virus

The authors are with the department of microbiology, University of Louisville School of Medicine, Louisville, Ky. Mr. Keller is assistant in microbiology; Mr. Braspenninckx and Mr. Kasdan are technicians. *The study was supported by a grant-in-aid from the General Electric Co., Appliance Park, Louisville. Mrs. Doris Bottorff prepared the HeLa tissue culture cells.*

because it is easy to detect and its quantitative assay is relatively simple and accurate. The soft agar overlay method of assay (*3*) was used in all bacteriophage titrations. Poliovirus type 1 was arbitrarily selected as a representative of the pathogenic enterovirus group. Titrations of poliovirus were carried out in HeLa cell tissue culture tubes. The infectivity titers of the poliovirus were computed by the Reed and Muench (*4*) method, using five tubes per dilution. The results of these titrations are expressed in TCD_{50}, the dose of virus which gives rise to cytopathogenic changes in 50 percent of the inoculated tissue culture tubes. In every poliovirus titration the HeLa tubes were read every 3 days, with the final reading on the 10th day after inoculation. This type of titration is based on an all-or-none response.

The virus diluent used in all the phage experiments was a peptone broth of the following composition: Difco Bacto-peptone 0.5 percent, NaCl 0.5 percent, pH 7.2.

Contamination and Sampling of Surfaces

Bacteriophage T1. A 4-square-inch area was accurately ruled off on each of a series of clean, glazed pottery dishes and the dishes were autoclaved. Each sample area was flame seared with a bunsen burner and then contaminated with a measured volume of virus suspension of known titer. To each sample area 0.05 ml. of whole egg suspension (freshly beaten egg) was added and mixed with the virus suspension. Whole egg suspension was selected as a protein soil because it is one of the most adhesive of food soils when dry. This mixture of virus and egg soil was evenly distributed within the circumscribed sample area and allowed to air-dry for 1 hour.

Nonabsorbent cotton swabs moistened with 2 ml. of neutralizing phosphate buffer (Difco) were used to swab the sample areas. The composition of the phosphate buffer rinse was as follows: monopotassium phosphate, 0.0425 gm.; sodium thiosulfate, 0.1600 gm.; aryl sulfonate complex, 5.0000 gm.; sodium hydroxide, 0.0080 gm.; distilled water, 1,000 ml. The pH was 7.2. Each dish was swabbed four times with the same swab, which was rinsed and expressed into the phosphate buffer between swabbings. Each swabbing was at a right angle to the preceding one. Each swab was then immersed in its original tube, which contained 2 ml. of the phosphate buffer, and was shaken mechanically for approximately 1½ minutes. Aliquots of the phosphate buffer rinse were then titrated to determine the percentage of the contaminating virus that was recovered. The specific number of phage particles initially applied to each test surface area is shown in table 1. These values were determined by titrating aliquots of the contaminating phage suspension prior to applying measured volumes to the test surface areas.

Poliovirus 1. The techniques used in the experiments with poliovirus 1 were quite similar to those employed in the bacteriophage experiments, with the following exceptions: (*a*) HeLa cell tissue culture tubes were used for the virus titration; (*b*) both whole egg suspension and horse serum were used as a "sustaining medium"; and (*c*) Hanks' balanced salt solution (BSS) was used for the cotton swab-rinse instead of the neutralizing phosphate buffer. The latter was not used because of its toxicity for HeLa cells. A 0.1-ml. inoculum of the

Table 1. Recovery of bacteriophage T1 after drying 1 hour on a nonporous surface, using the cotton swab technique

Total virus particles [1]	Virus particles recovered	
	Number [1]	Percent
324,000	(2)	
32,000	(2)	
1,620	508	31
162	48	23
46	19	41
46	23	50
42	32	74
42	24	57
34	15	44
34	25	73
23	12	52
23	12	52
16	12	75
16	6	37
1.6	0	0
1.6	0	0

[1] Per 4 square inches of surface.
[2] Too numerous to count.

buffer solution produced a 4+cytopathogenic effect in 24 hours.

A notation relative to the toxic effect of neutralizing phosphate buffer on HeLa cells is believed to be of interest because the buffer rinse in question is routinely used in most sanitation studies employing the cotton swab-rinse technique. The toxic effect was observed when 0.1 ml. of the buffer was added to HeLa cell cultures containing 1 ml. of nutrient fluid. In order to eliminate bacterial contaminants, 400 units of penicillin, 400 μg. of streptomycin, and 200 μg. of mycostatin were used per milliliter of Hanks' BSS. In view of the lability of poliovirus to desiccation at room temperature (*5, 6*), contaminated areas were sampled at time intervals of 5, 30, and 60 minutes.

In most of the poliovirus detection experiments using the cotton swab, a parallel series of experiments were performed concurrently, using a simple elution method. In the elution method, 1.5 ml. of Hanks' BSS was applied to the contaminated area and, after soaking for approximately 10 minutes, the area was gently rubbed with a ½-inch chisel-shaped rubber policeman. In all the elution experiments, the bottoms of glass petri dishes were used as the nonporous surface in order to contain the eluent. Subsequently, the eluent was pipetted off and assayed for infectivity titer.

In order to corrol orate the preliminary data obtained in the initial poliovirus detection experiments using a constant inoculum, a series of clean, sterile, flame-seared glazed plates were contaminated with tenfold dilutions of poliovirus in order to determine the end point of virus detection.

In Situ Determination of Inactivation

In situ tests were performed to determine the rate of inactivation of poliovirus due to drying at room temperatures. The surfaces of sterile glass coverslips (22 by 11 mm.) were each contaminated with a measured volume of a poliovirus suspension of known titer and allowed to air-dry. At each of four different time intervals, five of the coverslips were placed in Leighton tubes, and versinated HeLa cells were added. A monolayer of HeLa cells would establish themselves on the coverslip, thus growing in intimate contact with the virus-contaminated surfaces. The presence of infective virus was evidenced by cytopathology of the HeLa cells.

Controls were set up to determine if whole egg suspension exerted any inhibitory or inactivating effect on poliovirus. Parallel serial dilutions of poliovirus were carried out in which the diluent in one series was Hanks' BSS and the other diluent was Hanks' BSS containing 20 percent whole egg. After standing at room temperature for 1½ hours, both series of dilutions were titrated; the titers were essentially the same.

Results

From table 1, it may be seen that the percentage of recovery of bacteriophage T1 by the swab-rinse technique is quite variable. The number of phage particles initially applied to the 4-square-inch test areas are given in column 1 of table 1. These values were determined by first assaying the inoculum used for each duplicate set of plates, using the soft agar overlay plaque count method (*3*). Knowing the number of phage particles contained in 1 ml. of each inoculum, we were able to compute the number of phage particles present in the 0.2-ml. aliquots that were applied to each test surface area. The percentage of recovery ranged from 23 to 75 percent, with a standard deviation of 16.8 percent. Table 1 does show,

Table 2. Percentage recovery of poliovirus 1 after drying 1 hour on a nonporous surface, using cotton swab and elution techniques

Recovery time	Poliovirus recovered by—			
	Cotton swab technique		Elution technique	
	Number [1]	Percent	Number [1]	Percent
Total	199, 000	100. 0	199, 000	100. 00
5 minutes	82, 320	41. 0	100, 960	50. 00
30 minutes	10, 096	5. 0	31, 846	16. 00
60 minutes	400	. 2	505	. 25

[1] TCD_{50} per 4 square inches.

NOTE: TCD_{50}—Virus dose which gives rise to cytopathogenic changes in 50 percent of the tissue culture tubes.

however, that the swab-rinse method is sensitive enough to detect a virus population as small as 16 particles per 4 square inches of surface.

Statistical analysis reveals, at the 95 percent confidence level, that the true mean recovery of T1 phage particles from nonporous surfaces by the cotton swab-rinse method lies between 40.3 and 61.1 percent.

Table 2 shows the recovery of poliovirus 1 at different time intervals using both the swab-rinse and the elution techniques. The total line in table 2 shows the number of TCD_{50} of poliovirus applied to each 4-square-inch test surface. These values were based on an assay taken from an aliquot of the inoculum used. In comparing the recoveries obtained by both methods, when sampling was done 5 minutes after contamination, when the inoculums were still wet, a difference of only 9 percent was reflected, whereas recovery at 60 minutes was essentially the same by both methods.

The chart shows the rate of inactivation of poliovirus 1 due to desiccation at room temperature. The viable residual virus present at the end of each time interval was determined by the in situ method described under "Materials and Methods." The amount of poliovirus recoverable at various time intervals indicates a logarithmic order of inactivation during the testing time. From the following formula

$$K=\frac{\log B-\log b}{\text{time}}$$

the death rate constant was computed to be 0.04.

Rate of poliovirus inactivation with desiccation

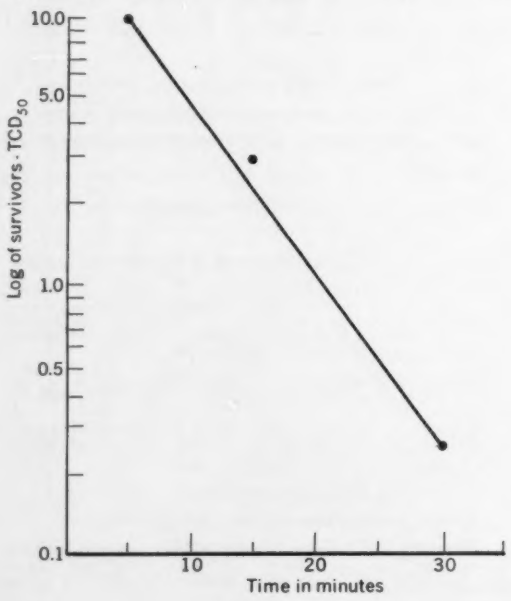

Table 3. Recovery of virus from plates contaminated with log decrements of poliovirus 1, using the cotton swab technique

Contaminated titer		Recovery of virus at—	
		5 minutes	
Number TCD_{50}[1]		CPE number tubes	Positive for virus
126,200		5/5	+
12,620		5/5	+
1,262		5/5	+
126		5/5	+
12		2/5	+
1		0/5	0
Number TCD_{50}[1]	Estimated TCD_{50}[1] after 1-hour drying [2]	60 minutes	
63,100	250.00	5/5	+
6,310	25.00	2/5	+
631	2.50	0/5	0
63	.25	0/5	0
6	.025	0/5	0

[1] Per 4 square inches.

[2] $K=\frac{\log B-\log b}{t}$; $0.04=\frac{4.800-x}{60 \text{ min.}}$

NOTE: TCD_{50}—Virus dose which gives rise to cytopathogenic changes in 50 percent of the tissue culture tubes.

CPE—Cytopathogenic effect.

Table 3 shows the sensitivity of the swab method in detecting poliovirus 1 on glazed plates contaminated with log decrements of the virus. The upper half of the table shows that a concentration of virus as small as 12 TCD_{50} per 4 square inches was detectable 5 minutes after the plates were contaminated. The lower half of table 3, which shows recovery of virus after 60 minutes of drying, reveals that the end point of virus detection occurs between contaminating inoculum titers of $10^{-2.8}$ and $10^{-3.8}$ per 4 square inches.

From the plate initially contaminated with 6,310 TCD_{50} per 4 square inches, the approximate amount of virus recovered was 0.1 percent. This is in the same order of recovery as shown by table 2, wherein 0.2 percent of the initial virus was recovered after 60 minutes of drying.

Discussion

In this preliminary study, two test viruses were employed: bacteriophage T1, a bacterial virus; and poliovirus 1, an animal virus. The two agents differ not only in morphology and size but also in their rates of inactivation during desiccation. It was believed that the phage virus would serve as an ideal indicator virus because of its stability and the fact that it can be titrated with a relatively high degree of accuracy. Under ideal conditions, phage has an infectivity ratio of one, which means that it may be assumed that a single plaque represents one phage particle.

In the phage experiments, all contaminating soils were permitted to air-dry in order to simulate conditions one would encounter in field sampling of "mechanical vectors." In sampling dried (1 hr.) contaminated nonporous surfaces with the swab-rinse method, a marked difference in recovery is observed between bacteriophage and poliovirus 1 (50 percent and 0.2 percent, respectively). The data indicate that this disparity is primarily due to the rapid inactivation of poliovirus by desiccation, rather than the inability of the cotton swab to "pick up" the poliovirus. This is evidenced by the following:

- When the test surfaces were sampled only 5 minutes after contamination, approximately 50 percent of the poliovirus was picked up by the swab.
- The percentage of poliovirus recoverable at various time intervals by both the swab and elution techniques approaches a logarithmic order of inactivation.
- The death rate of poliovirus 1 as determined by the in situ method indicated a logarithmic order of inactivation.

In the first phase of this investigation, the elution method was run in parallel with the cotton swab technique to compare differences in recovery of virus particles. In the second phase, however, it was decided to use the cotton swab-rinse technique only. This decision was based on the following reasons: (*a*) In view of the fact that only a slightly higher recovery of poliovirus was obtained with the elution method, it seemed reasonable to assume that the small difference in recoveries between the two methods was not statistically significant; (*b*) even if we assumed that the difference in recovery obtained by the two techniques, swab versus elution, represents a real difference, the versatility of the swab method in field sampling of irregular surfaces, such as forks, spoons, glasses, and so on, would compensate for the small loss in percentage of recoveries.

It is interesting to compare the results obtained in this study with the data reported by Angelotti and co-workers (*7*) in the detection of bacteria. In the current study, the mean value of phage virus particles recovered by the cotton swab-rinse method was 50 percent, with a 95 percent confidence interval of 40 to 61 percent, and the mean value obtained by Angelotti for the recovery of the test bacteria *Micrococcus pyogenes* was 52 percent, with a 95 percent confidence interval of 42 to 61 percent. It is to be emphasized, however, that the foregoing comparison of percentages of recovery is computed on the basis of the titers of the contaminating inoculums that were initially applied to the test surfaces. Angelotti used an in situ method, direct surface agar plate, for determining the number of bacteria present on the test surface prior to swab sampling.

Summary

A preliminary study was performed to determine whether the standard cotton swab-rinse technique for detecting bacterial contaminants could also be used for the recovery of viruses from nonporous surfaces. The results indicated that, under the experimental conditions described, the percentage of recovery of bacteriophage T1 virus approximates the precision obtained in detecting bacterial contaminants.

The data show that the cotton swab-rinse method is sensitive enough to detect virus when as few as 16 particles are initially applied to a 4-square-inch test surface area and air dried for 1 hour.

As few as 12 TCD_{50}, the virus dose which gives rise to cytopathogenic changes in 50 percent of the tissue culture tubes, of poliovirus 1 per 4 square inches were detected, using five HeLa cell culture tubes per sample, when sampling was done 5 minutes after the test surfaces were contaminated.

When the test surfaces were contaminated and then allowed to air-dry for 1 hour, the end point of poliovirus detection occurred between contaminating inoculum titers of between 6,310 TCD_{50} and 631 TCD_{50} per 4 square inches.

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Wider Use of Research Findings Urged

"The Costly Time Lag," a publication containing facts about the unnecessary loss of life, health, and money that results from failure to use new research findings has been released by the Public Health Service.

From estimates based on the U.S. National Health Survey and other data collected by the Service, the publication states that:

- 40,000 cancer deaths which could have been prevented occur every year.
- 40 million children are growing up without the protection from tooth decay afforded by fluoridated water.
- 20,000 persons die each year from preventable attacks of rheumatic fever and rheumatic heart disease.
- 60,000 new cases of tuberculosis occur every year although ways of preventing its spread are well known.
- 17 million persons have some type of chronic disability and a high proportion fail to receive care that could reduce handicapping effects.

The publication is designed to encourage wider use of the health-saving knowledge that has resulted from the findings of medical research during the past two decades.

The publication (PHS Publication No. 813) is on sale by the Superintendent of Documents, Government Printing Office, Washington 25, D.C., at 20 cents a copy.

Federal Publications

The Arden House Conference on Tuberculosis. *PHS Publication No. 784; 1960; 68 pages; 45 cents.*

Last fall, the National Tuberculosis Association and the Tuberculosis Branch of the Public Health Service held the Arden House Conference on Tuberculosis at Harriman, N.Y. Eighteen distinguished panelists were invited to discuss ways to use present knowledge to hasten the decline of tuberculosis in this country.

This volume presents the conference recommendations, a summary of the deliberations, and information about tuberculosis in the United States, which spells out in detail some aspects of the epidemiology of the disease.

Your Children and Their Gangs *Children's Bureau Publication No. 384; 1960; by Edith G. Neisser and Nina Ridenour; 34 pages; 20 cents.*

Directed to parents, this booklet is intended to explain why youngsters will give their greatest interest and even loyalty to a gang or club at some periods and seem to become almost strangers in their own homes.

It discusses the meaning of groups, how they help children grow, what is meant by the group "code," and the forms which groups may take. Constructive ways in which parents can express their interest in children's activities are also outlined.

Indians on Federal Reservations in the United States. A digest. Phoenix Area. *PHS Publication No. 615, pt. 6; 1961; 58 pages.*

This is the sixth in a series of digests of selected information about Federal Indian reservation groups which for health purposes are under the jurisdiction of the Division of Indian Health, Public Health Service.

The digest covers Indian groups in the Phoenix Indian Health Area, comprising Arizona, California, Nevada, and Utah. The subject matter includes a brief description of location, ownership, and topography of reservation land; population groups; social characteristics including homes, education, and income sources; and health services and health status.

VD Fact Sheet, 1960. Basic statistics on the venereal disease problem in the United States. *PHS Publication No. 341 (17th revision); 1961; 23 pages.*

Directed to public health specialists, physicians, and those concerned with statistics and data relevant to venereal diseases, this booklet presents up-to-date information on the incidence and prevalence of syphilis and gonorrhea.

It also discusses casefinding activities, mortality and insanity due to syphilis, and penicillin in the treatment of venereal diseases.

Statistical tables show figures for cases, costs, and treatment schedules.

Field Rodents. Public health importance and control. *PHS Publication No. 797; 1960; by Harold George Scott; 4 pages; 5 cents.*

A training aid, this leaflet lists diseases transmitted by field rodents and discusses recognition of rodents, population dynamics, and surveys. Shipping specimens for identification, rodent and ectoparasite control, and trapping and excluding rodents are also covered.

Instructions for field sanitation, use of chemical exterminators, and avoidance of hazards are given.

A Report on Social Security Programs in the Soviet Union. *Social Security Administration Publication (unnumbered); 1960; 157 pages; $1.*

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This report also covers family allowances, social security on collective farms and for producers' cooperatives, statistical data and analysis of the social security system, and welfare services and assistance.

The training of social security personnel and banking, insurance, and other aspects of economic security are considered. Health conditions and fertility analysis, opinions and views of the populace on social security, and related matters are reported on.

A Study of Student Nurse Perception of Patient Attitudes. *PHS Publication No. 769; 1960; by Rena E. Boyle; 77 pages; 45 cents.*

Methods and findings of a 2-year research project on the ability of student nurses to recognize which hospital nursing services are most important to their patients are reported. Also included is a description of the prior pilot study conducted to develop appropriate study methods and techniques.

Data are given for questionnaire or interview responses by 386 undergraduates of 7 schools of nursing and their 9 affiliated hospitals and 290 patients selected by the students as those they "knew best."

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